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FOURTH REPORT

—OF THE—

MONTREAL

HORTICULTURAL SOCIETY

AND FRUIT GROWERS' ASSOCIATION OF THE
PROVINCE OF QUEBEC,

—FOR THE—

YEAR 1878.

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N. S. WHITNEY, *Vice-President.*

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Montreal:

"WITNESS" PRINTING HOUSE, 33, 35 & 37 ST. BONAVENTURE STREET.

1879.

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MONTREAL HORTICULTURAL SOCIETY AND FRUIT-GROWERS' ASSOCIATION.

SECRETARY'S REPORT.

The Annual General Meeting of this Society and Association was held on the 5th of December last. There were present:—Mr. G. Cheney, Vice-President, in the chair; Messrs. Wm. Cook, G. Buddo, the Messrs. Duff, R. Imrie, J. D. Nutter, S. S. Bain, R. W. Shepherd, J. B. Goode, T. McPherson, C. K. Adams, N. S. Whitney, Hon. L. Beaubien, M. Gorman, Dr. Brewster, B. Gunning, I. Wotherspoon, C. Gibb, A. Duke, Dr. Andres, W. Ewing, R. Spriggings, J. Doyle, and others.

The minutes of the last meeting were read and approved.

Moved by Dr. ANDRES, seconded by Mr. DOYLE, That this report be received and adopted and the manner of publication left to the Board of Directors. Carried.

Moved by Dr. ANDRES, seconded by Mr. N. S. WHITNEY, That a committee of three be appointed to name nine gentlemen to form a Board of Directors.

Moved by Dr. ANDRES, that R. W. Shepherd, Hon. L. Beaubien, and C. Gibb, be the committee.

The voting for Board of Directors was proceeded with and the following gentlemen were elected:—Messrs. G. Cheney, J. Morgan, jr., J. Doyle, W. Evans, N. S. Whitney, R. W. Shepherd, jr., Hon. L. Beaubien, Dr. Andres.

Mr. J. MORGAN, jr., offered to resign in favor of Mr. Dickson, so that Point St. Charles would have a representative.

It was generally agreed the result of the ballot could not be changed.

Mr. BAIN suggested that at future elections the different sections should have representatives, so as to spread the interests more directly over a large extent.

Moved by Mr. J. MORGAN, seconded by Mr. DOYLE, that Messrs. Atwater and R. W. Shepherd, jr., be the auditors for the coming year. Carried. Meeting then adjourned.

At a meeting of the Board of Directors, Mr. Cheney was elected President, Mr. N. S. Whitney, Vice-President, and Mr. H. S. Evans, Secretary-Treasurer, re-elected.

THE ANNUAL REPORT.

The following is the yearly account and report submitted :—

It is gratifying at the outset to be able to say that in spite of the continued depression in all branches of industry, the affairs of the Society are in a highly satisfactory condition. Favorable as have been the reports presented at the close of the year for the past four or five years, I think that the one presented this year is even more full of promise. This fortunate state of affairs has, however, only been attained by a great deal of exertion, and a very earnest desire on the part of those entrusted with the management of the Society's affairs, to do everything in their power to make it creditable to the Province and worthy of the position it occupies. Through the kindness of the newspaper press of this city, the Report read at the last annual meeting was published next day. It attracted the attention of the then Premier of this Province, the Hon. C. B. DeBoucherville, and a correspondence ensued which ultimately resulted in an interview with the Premier in Montreal, at which a delegation of the society was present. The result was most encouraging, and the Hon. Mr. DeBoucherville expressed a very warm interest in the work of the Society. The delegation pointed out to him some of the disabilities under which they labored, and he agreed to give every attention to any suggestions for the better working of the Society that might be laid before him. A number of suggestions were made, but feeling how important it was that the work should be well and thoroughly done, and partly at Mr.

Browning's suggestion, a delegation was named to proceed to Quebec to lay the matter fully before the Government. The following gentlemen were chosen:—Messrs. N. S. Whitney, Chas. Gibb, Dr. Andres, and the Secretary. The Hon. the Premier received them very courteously, and promised to do all in his power to accede to their wishes. The Society are particularly indebted to the Hon. Messrs. DeBoucherville and Beaubien, also to E. A. Barnard, Esq., Director of Agriculture, and other gentlemen connected with the Council of Agriculture for the friendly interest manifested and aid given. The result was most favorable, and after the passage of the new Act a special general meeting of the Society was called for the 16th of May last to take the necessary steps to form the new association as provided for in the new Act. The present Society, while local in the respect of always holding its exhibitions in Montreal, is provincial in that it opens its exhibitions to the whole Province. Strong efforts having been put forth within the last three or four years to quicken the interest in fruit-growing in this Province, it was thought that the name chosen for the new association should be explanatory of the work the Society has in view. For this reason the name chosen was that of the "Montreal Horticultural Society and Fruit-Growers' Association of the Province of Quebec." In purely horticultural matters the influence of the Society will be mainly felt in and near this city; but in matters relating to fruit-growing, it is hoped that it will exert a useful and powerful influence throughout the whole Province. At this meeting the Board of Management and Report Committee that it replaced was unanimously elected for the new Society, viz: Messrs. J. D. Gibb, G. Cheney, Hon. Louis Beaubien, Jas. Morgan, jr., W. Evans, J. Doyle, R. Spriggings, T. McPherson, A. Duff, and Secretary and Treasurer, H. S. Evans. Report Committee, Chas. Gibb, R. W. Shepherd, jr., Jas. Morgan, jr., M. Gorman and J. Jordan.

At the first meeting of the Board held subsequent to the general meeting, J. D. Gibb, Esq., was elected President, and G. Cheney, Esq., Vice-President. The constitution and by-laws were framed under the direction of the Directors, N. S. Whitney, Esq.,

and Dr. Andres, of the By-Law Committee. A special general meeting was called for 27th of May, at which, after being read clause by clause, the by-laws were finally passed and ordered to be sent to Quebec for the approval of the Lieut.-Governor. The change of Government at Quebec delayed matters somewhat, but they received the necessary sanction and became binding on the Society on the 9th July, 1878, no amendment having been suggested. The constitution and by-laws of the Society have been printed and a copy sent to each member of the Association. Those who have examined them must at once see that the Society is placed on a good footing, and, with careful and judicious management, cannot fail to do a good work, and one greatly needed in this Province. The changes made have necessarily entailed a great deal of thought and labour on the board of management of the Association; but the other operations of the Society have been carried on with vigor. The work of the Report Committee is now in the hands of the members, and an examination of the Report will show that it reflects credit not only on the Society, but also on the gentlemen who had immediate charge of the work. The delay in the publication has been owing to a misunderstanding. The Society have now done the work themselves, and are to receive a grant from the Government of \$200 to aid them in it. Mr. Lesperance, of the *Canadian Illustrated News*, examined and corrected all the manuscripts, and the society are indebted to him for the careful manner in which he seems to have done his work. The printing was done by tender, the lowest, and in other respects the best, having been accepted. Monthly meetings of the Society were held during the months of February, March, April and May, at which some interesting discussions took place and some exceedingly good papers on different subjects were read. It is a matter of regret that the attendance at these meetings was not larger. Owing to lack of money and the uncertain prospects of the society, the idea of holding an early summer exhibition, as was proposed, had to be abandoned. If the Society are really desirous of having a summer exhibition the proper way to do would be to purchase a large tent, get proper tables and trestles made, and by so doing two very

serious items in the expenses might be reduced, viz.: the rent of a building and the carpenters' bill. The regular exhibition, however, which took place in September, was by far the largest and finest the Society has ever had. The Association secured the Skating Rink for the purpose, and the large building was completely filled. The number of entries made was about one thousand. There were only three sections in which there was no entry, and to make up for this five extra sections were added for articles unenumerated. Many of the finest plants in Montreal were on exhibition, and when we consider that we have no large public gardens, and that the only opportunity many persons have of seeing these magnificent specimens is at the exhibition of this society, all lovers of flowers cannot but feel indebted to the owners and exhibitors for permitting them to be shown. The exhibit of cut blooms was also good, but in many cases not well shown. Some of the boxes used were much too large, and this branch of the exhibition will never present the appearance it should till the size of box a certain number of specimen blooms shall occupy is strictly defined, and all boxes exceeding the specified size disqualified.

The show of grapes was magnificent, and the public spirit of one of the members in offering year by year a handsome prize for the best bunch has evidently had a very stimulating effect. Some very fine peaches, plums and nectarines were also shown, and certainly went far to prove that this country is not such an ice-bound wilderness as some would have it supposed. There was a fine display of pears on exhibition from various gardens, but perhaps the most noticeable thing was the magnificent collection of apples shown from different parts of the Province. Four county collections were exhibited, viz., one each from Huntingdon, Rouville, Vaudreuil and Missisquoi. The collections shown by the two first-named were particularly large and fine. In each were shown varieties comparatively unknown and not cultivated on this island, but which might perhaps be grown with advantage. The collections from Vaudreuil and Missisquoi were good, but much smaller. Mr. Edwards, also, of Huntingdon County, showed a fine collection of fruit, both named and seedling, and his success

in obtaining prizes must have been both gratifying and encouraging to him. The society has certainly made a step in the right direction, and the prizes offered for apples might be increased with great advantage to the country and also to the society. It is satisfactory to know that a good many amateurs were both exhibitors and winners of prizes. It is most desirable for the welfare of the society that amateur growers should become interested in it, and if prizes were offered for single plates of different varieties of apples, or best bunch of different varieties of out-door grapes much would be done to obtain that object. The Ontario Fruit-Growers' Association offer prizes, as I have suggested, and in the new work we have marked out for ourselves to do we can learn much from their experience. The display of plants, bouquets, floral ornaments, &c., shown by amateurs, was exceedingly creditable. Mr. Dickson, of Point St. Charles, was the most successful, having obtained \$53.25 in prizes. One lady amateur, it is gratifying to note, was successful in obtaining prizes both in the gardeners' as well as the amateur class.

They should by all means be encouraged in this, and I would suggest that a certain sum of money be placed at the disposal of a committee of ladies to offer in prizes for competition by ladies exclusively, those exhibiting being allowed to compete in these classes on payment of a nominal fee, which should include admission to the exhibition.

The competition in many of the sections was severe, and about eleven-twelfths of the prize list offered was absorbed in paying the prizes awarded, which is an unusually large proportion. The prizes of a piece of plate valued at \$20 offered to the winner of the largest number of 1st prizes in the amateur and gardener class, were awarded to Messrs. Jas. Dickson and W. B. Davidson respectively.

The Dominion elections taking place during the exhibition, very materially reduced the receipts from tickets sold at the door. The different railway and steamboat companies kindly reduced their fares to those desiring to visit the show, and every effort was made to give publicity to it, but the excitement was so great

throughout the country that the efforts did not meet with the success that was anticipated. If the Council of Agriculture hold an Exhibition here next year, it might be arranged that the two Associations advertise together, thereby lessening the expenses for each. The Society having offered prizes to the members obtaining the largest number of new subscribers for the year, the first prize of \$15 was awarded to Mr. Wm. Evans, and the second prize, \$10 to Mr. Jas. Morgan, jr. It was hoped that the members generally would have exerted themselves more to obtain members; all or nearly all can do a little, and if a few would only undertake to devote two or three days to the work, both the Secretary's duties and the Society's expenses would be materially lightened. Another much needed improvement is the providing of proper permanent trestles lower than those at present in use. If this was done the cost would probably be saved in two years by the saving of rent for a building, and the carpenter's bill, besides facilitating the laying out of the building in a wonderful degree. The thanks of the Society are due the press for the many friendly notices given the Exhibition, also to J. D. Gibb, Esq., now in England, for the valuable aid given by him in obtaining members. The Association are also indebted to Mr. Jas. Morgan, jr., for his services this year in decorating the building; also to Mr. Hopkins for having furnished the Society with a plan for the erection of a band stand. The library of the Society continues to grow slowly, and any donation of books on horticultural subjects that members may feel disposed to give will be very acceptable. The number of members who paid their subscriptions the past year was 721, producing an income from that source alone of \$1,427. When it is remembered that the Society this year did not offer any premiums for poultry or pet stock, and that many persons withdrew their names on this account, the retention of such a large number of members on the roll year by year must be regarded as an evidence of the popularity of the Association and of the energy with which it is managed. During the last three years the amount of subscriptions collected from members is \$4,577 and no single subscription exceeded two dollars. The total income of the

Society the past year from all sources, is as follows:—Members' fees, \$1,427; Government grant, \$1,000; interest on Bank Stock and current account, \$88.49; receipts at door during exhibition, \$477.60; sundry other sources, \$99.50; total, \$3,092.59. The gross expenditure has been \$3,295.03, leaving a balance on hand on deposit in the Merchants Bank of Canada, of \$416.04.

In consequence of the change in the Constitution of the Society and the Directors now determining the Secretaries' salaries, the amount voted at the annual meeting in December last is included in this amount, though properly speaking it was a liability incurred in 1877. The Society is practically \$247 better off than at the last annual meeting, and in addition to this \$156 worth of property has been added to the plant of the Society.

The total assets of the Society are valued at \$2,331.04, and are as follows:—Plant, such as tables, trestles, plates, fruit-cases, flags, table-furniture, band-stand, fowl-coops, etc., about \$790.00; three shares Bank of Montreal stock, cost \$1,119.00; cash on deposit, \$416.04.

The Hon. Mr. Joly visited the Society's Exhibition this year, and expressed himself highly delighted and surprised at what he saw. The Society is fortunate in having a Commissioner to deal with who takes such a deep interest in these matters as the Hon. the Premier.

Few persons are aware how important an industry the culture of fruit has become on this continent, and from official statements published lately in the United States, it is set down in that country at about ten million dollars per annum. Much more fruit can be easily raised here than has been done heretofore, and if this Society is supported as it should be, this branch of industry will now receive a great impetus in this Province.

HENRY S. EVANS,
Secretary and Treasurer.

THE TREASURER'S STATEMENT.

THE MONTREAL HORTICULTURAL SOCIETY AND FRUIT GROWERS' ASSOCIATION OF THE PROVINCE
OF QUEBEC, IN ACCOUNT WITH HENRY S. EVANS, SECRETARY AND TREASURER.

DR.

CR.

To Balance.....	\$ 618 48	By paid Secretary amount of salary voted for season of 1877.....	\$ 450 00
Amount received from members' subscriptions.....	1,427 00	" sundry rents for Rink and rooms.....	186 50
" of Government Grant.....	1,000 00	" sundry persons for labor and attendance....	102 12
" received for tickets of admission to Society's exhibition.	477 60	" prizes to date.....	1,055 50
" of interest received on current account and dividend on bank stock.....	88 49	" for printing, stationery, books, stamps, advertising, &c.....	487 43
" received for special prizes.....	50 00	" sundry expenses connected with Exhibition and sundries purchased.....	441 60
" sundries.....	49 50	" Judges expenses to Exhibition.....	54 50
		" Secretary and Treasurer's amount voted by Directors as salary for year 1878.....	500 00
		" cartages.....	17 38
		Balance cash on deposit in the Merchants Bank of Canada.....	416 04
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CANADIAN TIMBER TREES.—THEIR DESTRUCTION AND PRESERVATION.

BY A. T. DRUMMOND.

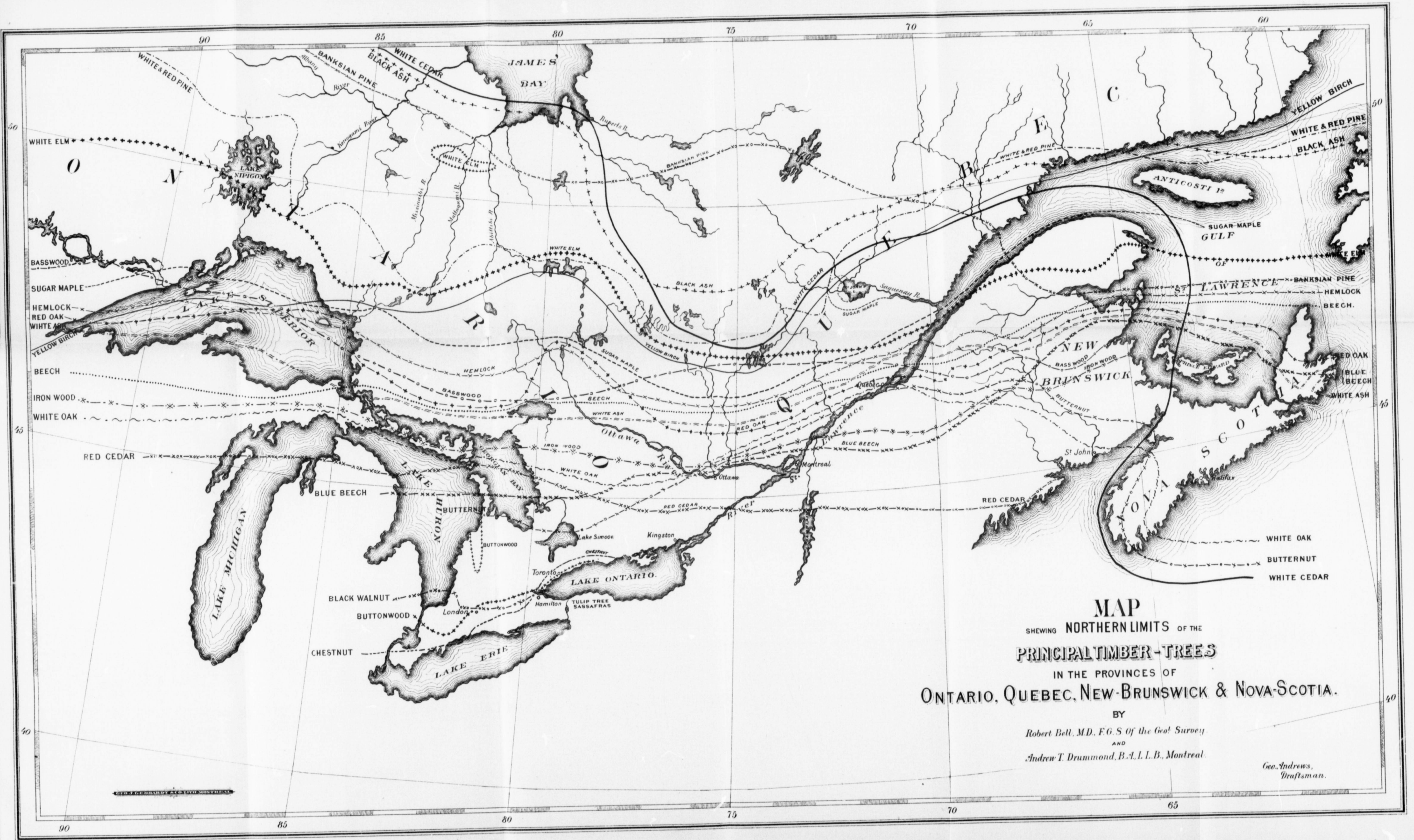
Apart from agriculture, no individual industry in Canada has such importance as the lumber trade. In the United States, industries based on the manufacture of lumber and timber are only exceeded in point of magnitude by the iron interests. The extent of territory on this Continent covered by forests, the number of men directly employed in preparing the products of these forests for market, and the very numerous and important industries to which the use of timber and lumber give rise, all point to the subject of our timber trees as of national interest. We have, in fact, little conception of the magnitude of the lumbering business in the country, until we are brought face to face with statistics in regard to it. About twenty-one per cent. of the whole American Continent is believed to be woodland. In North America alone, it is estimated that 1,460,000,000 acres are covered by trees, and of this quantity about 900,000,000 are in Canada. Contrast this with the acres of forests and woodlands in the European States. Prussia has, it is said, about 10,000,000 acres; Bavaria, 3,300,000, France, 2,700,000; whilst England and Belgium are so denuded of forests as to have but insignificant areas of these in proportion to their sizes. These vast woodlands in Canada include a very considerable portion of Ontario and the eastern provinces, and of British Columbia, whilst in Manitoba, the country, excepting in the Eastern and North-Western sections, is chiefly prairie, and in the North-West Territories, the true forests are largely along and north of the Saskatchewan.

A few facts will give some conception of the importance of these vast woodlands to us, and at the same time of the enormous annual drain on our lumbering resources now going on. In the three

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years ending 1872, when the lumber trade saw its halcyon days, the production of deals and boards in the Ottawa and St. Lawrence valleys alone, amounted to an average annually of 809,000,000 feet. The average number of logs annually cut in those valleys, and brought to the banks of the streams to be floated down to the saw mills engaged in the production of this large quantity of deals and boards, was 5,264,000. Whilst of the product of these mills an annual average of 1,000,000 feet went to Great Britain, 93 cargoes were, in 1872 alone, shipped to South America, and 276,000,000 feet were taken by the Eastern United States; that part of this large quantity which was shipped by the water routes being embraced in 1,720 cargoes.

During the same three years the exports of square timber from Quebec averaged 21,558,000 cubic feet annually. The square timber went chiefly to Great Britain, and whilst about three-fifths of it was white pine, there was included no inconsiderable proportion of other trees. Nearly one-sixth was composed of oak, one-twelfth of red pine, one-nineteenth each of birch and elm; ash, basswood, tamarac, walnut and butternut largely making up the balance.

But aside from lumber and square timber cut for export, there is an enormous consumption in the Dominion—a consumption greatly increased by the progressive spirit of the past thirty years. There are in the Dominion about 6,000 miles of railroads, which originally required in their construction 18,000,000 of sleepers or railway ties, and, taking the life of a tie at five years, the annual requirements of these railways must be towards 3,500,000 ties. Each railway has its telegraph system requiring originally the cutting down of 175,000 young trees to supply the requisite poles, and a large annual addition to replace those which become decayed or otherwise unserviceable. On the sides of the railways would be probably 12,000 miles of fencing, necessitating 9,000,000 pickets, and over 60,000,000 feet of sawn timber in its construction. House-building and pavements alone must annually consume an enormous amount of lumber; but wood enters very largely even into the manufacture of what we are accustomed to regard as insignificant

articles. Shoe pegs are estimated to require in the United States an annual supply of 100,000 cords, whilst lasts and boot-trees require 500,000 more. Even the manufacture of tools consumes on this continent about half a million cords of the finest qualities of timber.

Vegetation is not distributed over the globe regardless of order. There is a regular series of changes from the tropics to the Arctic seas. Under the equator are the palms, bananas and plantains: in the tropical zones on either side are the fig-trees and ferns of tree-like growth; beyond the immediate tropics are included some of the vast sandy barrens or deserts of the warmer regions of Africa, Asia, and America, in which grow the succulent fig-marigolds and curious cacti; in higher latitudes are the countries of the orange, the pomegranate and the vine, with the zone of the pines, firs and other evergreens beyond, shading thence gradually through heathers and grasses, until at the base of the glaciers in polar lands vegetation is chiefly met with in the form of variously colored lichens mottling the bare rock. A series of changes precisely corresponding to this is met with on mountain sides. Vines are cultivated in the valleys at the base of the Alps; in the course of the ascent chestnuts, beech trees, firs and little downy Alpine plants become successively prevalent until at about 9000 feet the region of continuous snow begins. These successive changes in the vegetation are not inaptly likened to a series of belts of somewhat irregular breadth bound one above the other around the mountain sides.

Canada lies partly in the Arctic zone, characterized by an absence of trees, partly in a semi-Arctic zone of poplars and birches, and partly in two more temperate zones of pines and beech trees, whilst in the southern sections are a few of the characteristic trees of the Middle United States.

There are sixty-five species of trees in Ontario, Quebec and the Maritime Provinces. Of these, excepting perhaps one, all are found in Ontario, south of the Ottawa River and Georgian Bay, whilst probably a dozen range as far north as James Bay.

Not much is yet known of the range of our timber trees west of

Lake Superior, but we are now fairly familiar with it in the country around that lake and eastward of it to the Atlantic Ocean. The eastern provinces are within the region of the tree forests, whilst a very large part of Manitoba and an immense section of the territory between that province and the Rocky Mountains is more or less open prairie. The vast country commencing with Labrador and thence skirting Lake St. John, Hudson Bay and the north shores of Lake Nipigon, onwards to the Saskatchewan and Peace River northward, forms the zone of the balsam, poplar, white birch, aspen and tamarac. South of this in the Provinces of Quebec and Ontario are the zones of the pines and the beech—the beech being chiefly limited to the region south of a line drawn from the outlet of Lake Superior to Quebec. In that part of the peninsula of Ontario lying west of the Niagara River is an outlier of another zone, represented there by the walnut, buttonwood, tulip tree, sassafras and the chestnut, and by an increasing abundance of white, red and other oaks.

There are various causes influencing the range of vegetation in the Dominion, but in Ontario and Quebec the northern limits of trees are largely circumscribed by the physical condition of the country as well as by the climate. The height of land or watershed from which the rivers flow on the one side to Hudson Bay, and on the other to the great lakes and the St. Lawrence, has a very tortuous course, and beyond it very few species of trees range northward. The country on either side of this watershed for some distance is more or less mountainous. To the northward of Lake St. John the whole country is very broken, whilst extensive cold swamps are everywhere interspersed through the Albany River section. Both the red and white pine appear to follow somewhat closely the watershed in their northern limits of range.

To the most casual observer the absence of trees and of mosses is a striking feature of the prairies of Manitoba and westward. That the frequent fires which devastate the prairies have much to do with the scarcity of trees is beyond question. This very scarcity, however, gives rise to a more than ordinary rapid evaporation of moisture from the soil and thus deprives the mosses of that con-

dition which is so congenial, and in most cases, necessary to their growth, and accounts thus for their absence.

The section of country surrounding Lake Superior has a peculiar flora. On the lake margin, but especially on its jutting headlands the vegetation has almost a semi-Arctic type. The beech and white oak are everywhere absent, while on the north shore the red oak, maple and basswood are almost entirely wanting. But it is less among the trees than among the herbaceous forms that the vegetation is striking. On Keweenaw Point and Thunder Cape are semi-Arctic plants—the remnants—like the Maritime plants of this and other great lakes—of a former flora, and suggestive of the colder climate of that part of the country in a now-past epoch. The moist, cool but equable atmosphere, resulting from the presence of such a large body of deep water as Lake Superior, readily accounts for the continuance of these little plants there, and has much to do with the absence of so many of the larger forms of vegetation. A short distance inland from Thunder Bay—and this no doubt is a mere illustration of what occurs everywhere on the coast of the lake—there is, however, a remarkable change. As the effect of the lake air becomes less perceptible, plants of more temperate range appear, until at about two miles or more up the Kaministiquia River no boreal or semi-Arctic plants are met with, and the vegetation has much the appearance of that of the river valleys of Central Canada.

The vegetation of the projecting headlands of the lakes is affected by the action of the general flow of the waters of these lakes towards the sea, plants peculiar to the southern and western sides of the lakes being thus found on the immediate shores of the northern sides as well. On the other hand, the coasts of the Lower St. Lawrence are influenced by the cool atmosphere attending the Labrador Arctic Current, a branch of which enters the Gulf of St. Lawrence by the Straits of Belle Isle.

So rapidly has the Western Ontario Peninsula been brought under cultivation that we can hardly now realize the extent to which it was covered by magnificent forests fifty or more years ago. In 1834 this part of the country was visited by Robert Brown and

James Macnab, and their observations are thus referred to by J. C. Loudon: "In the neighbourhood of the falls of Niagara the trees were of various descriptions, of great size, and more intermixed than we had hitherto seen. The tulip trees were of great height, with stems varying from 8 ft. to 12 ft. in circumference. Platanus trees, oaks, elms, limes, ashes, walnuts, beeches, poplars and white pines were all equally large and lofty. The hemlock spruce was scarcely seen, but the arbor vitæ seemed to take its place, for it is, without exception, the most abundant tree in the neighbourhood of the falls, very tall, and sometimes tapering to a height of 60 ft. Between Niagara and Hamilton was the only district in Canada where the *Laurus Sassafras* was seen: the trees were all small though remarkably healthy. The great natural forests of the country presented chiefly oaks of great height, and when the ground became in the least degree elevated, white pines abounded. Near New London (now London) the specimens of the trees, particularly of the platanus (plane tree or buttonwood) were very large. Stems were measured of from 15 ft. to 20 ft. in girth, and many of the trees had straight trunks of from 10 ft. to 30 ft. high before branching. The white pine near New London has a trunk varying from 13 ft. to 18 ft. in circumference, and some trees which had been blown down were measured and found to average 160 ft. in length. The oaks here vary from 10 ft. to 15 ft. in circumference of trunk, with 45 ft. and 50 ft. of straight clear stems. Between New London and Goderich, a distance of 60 miles, the road passes through one continued dense forest. The trees were principally elms, averaging from 10 ft. to 25 ft. in circumference. Mixed with them were beeches, birches and ashes of ordinary dimensions. Horizontal sections of the white pines and hemlock spruce exhibited between 300 and 400 annual layers; oaks 200; and elms 300. On the banks of the Maitland River many very noble specimens of platanus are seen with stems varying from 18 ft. to 36 ft. in circumference."

The extent to which the different species of timber trees individually occur in Canada is a matter of great interest in view of the increasing demand for lumber. The PLANE TREE OR BUTTON-

WOOD, and the CHESTNUT are hardly now in sufficient abundance to make them economically important, and, as already indicated, their range in Canada is very circumscribed. The BUTTONWOOD grows most luxuriantly on the banks of rivers, in deep, moist soil. BLACK WALNUT has become scarce, and threatens soon to become virtually extinct. It is now chiefly found with us on the tributaries of the River St. Clair. BUTTERNUT and WHITE OAK have about a similar range in Eastern and Western Ontario, and though not now of very large size, are in fair abundance, especially in the Western Peninsula; but in the Province of Quebec they are comparatively scarce, White Oak becoming a rare tree in the St. Lawrence Valley towards Quebec, though found inland. Butternut is said to be absent on Bay of Fundy coast. BASSWOOD is on the whole plentiful in the country lying south of a line, drawn from the Bay of Fundy to Thunder Bay. In Southern Manitoba it is also a well-known tree. In Western Canada it enters somewhat largely into the commoner classes of furniture. Even as far north as the Manitoulin Islands it is frequent, and is there a large tree, sometimes attaining two feet in diameter. A small outlying number of these trees, as well as maples, around Lake St. John, would seem to indicate a milder climate there than the high latitude of the lake would suggest. RED OAK is entirely absent from the whole north shore of Lake Superior, excepting, curiously, Michipicoten Island. It is a common, though not now a very large tree, throughout Ontario, occurring as far north as Lake Temiscamingue at the head-waters of the Ottawa; and in the Province of Quebec ranges down the St. Lawrence Valley towards the neighbourhood of Quebec. YELLOW BIRCH appears to be a more familiar tree in this valley than around the great lakes. In Gaspé square timber two feet across is made from it. WHITE BIRCH, on the other hand, is a more northern tree, occurring everywhere far north, and in considerable abundance—even at Moose Factory, on Hudson Bay, being large enough for canoes.

WHITE ASH is fairly common from the neighborhood of Montreal West to the Georgian Bay District and Manitoulin Is-

lands and Southward. BEECH has a somewhat similar range, but is found farther down the St. Lawrence Valley, and occurs on the northern shores of Lake Huron. In Central and South-Western Ontario it is perhaps the most commonly met with tree. In New Brunswick, though met with inland, the beech is absent from the Bay of Fundy coast—the result, probably, of the heavy fogs there.

SUGAR MAPLE is an abundant tree in Nova Scotia, Prince Edward's Island and New Brunswick, throughout the St. Lawrence Valley, and in Western Ontario as far as the north shore of Lake Huron and as the east and west, but not the north coasts of Lake Superior. ASPEN and BALSAM POPLAR, whilst familiar trees throughout Ontario and Quebec, range far Northward from Newfoundland to James Bay and northwestward, and are most abundant in these higher latitudes. WHITE ELM, perhaps our most graceful tree and forming also a valuable item of export, is fairly common from Gaspé to Lake Nipigon and Southward, and especially in the western peninsula of Ontario. In the valley of the Moose River, about 120 miles from its mouth, Prof. Robert Bell has found a small outlier of these trees. RED CEDAR as a shrub extends high northward, but as a tree it is scarce north of the Georgian Bay and north or eastward of the Ottawa River, and is little known in the Ottawa Valley. On the other hand, WHITE CEDAR, or ARBORVITÆ, is common everywhere from Gaspé and Lake St. John through the upper Gatineau district to James' Bay and southward. Even in the Ontario peninsula it grows luxuriantly, attaining a height of sometimes from 50 to 60 feet. In New Brunswick it is not uncommon, but in Nova Scotia and Newfoundland it seems to be wanting.

HEMLOCK occurs in Nova Scotia, but is rare or wanting on the east coast of New Brunswick, and is wanting in Gaspé and in the Lake Superior district, whilst in the Province of Quebec, south of the St. Lawrence, it is very abundant, its bark forming there a most important item of export. In the Ottawa Valley and in the Ontario peninsula it is a fairly well known tree. TAMARAC is comparatively common throughout both Ontario and Quebec, and even as far northward as Moose Factory, on Hudson Bay, is a large tree measuring two feet in diameter of its trunk.

The WHITE and RED PINES are, however, the trees in which centre perhaps the most interest. PITCH PINE is of mere local occurrence and the BANKSIAN PINE, though abundant in the Lake Superior region eastward to the Lower St. Lawrence and of merchantable size, according to Prof. Robert Bell, along the southern branches of the Albany River, is in the more accessible sections only a scrubby tree. In the Province of Quebec south of the St. Lawrence little pine is now left, though thirty years ago large lumbering operations were carried on in the country lying south of Quebec and east of Sherbrooke. In the Ontario peninsula as well, pine is now scarce and even what is there is of small size. The maximum development of the red and white pine appears to have been attained in the stretch of country extending from Gaspé and New Brunswick through Northern Maine and the Saguenay district along the valley of the St. Lawrence westward to the Ottawa River and Georgian Bay, and onward through Northern Michigan and the district on the north shore of Lake Huron and the Lake Superior country to Rainy Lake. In Eastern Manitoba there is some pine, but the zone of true forests beyond that province onward to the Rocky Mountains chiefly includes aspen, balsam, poplar, white birch and Banksian pine. Large as this territory is in which the white and red pine are found, the extensive sections of country now left quite destitute of pine warn us that these pine forests are not co-extensive with our annual requisitions on them. In the Ontario Legislature it was recently stated that one source of revenue of that province was visibly affected because that notwithstanding this is probably an error—there were no more timber limits available, all apparently being under lease to lumbermen. At the present time the St. Lawrence and Ottawa valleys furnish the larger part of the pine lumber and timber. Very nearly as much is annually cut on the St. Lawrence and its tributaries below Montreal as in the Ottawa valley, but contrary to the general impression and to the customs returns, very nearly two-thirds of the square timber and the lumber, manufactured on the Upper Ottawa is, as Mr. A. J. Russell has pointed out to me, from the Ontario forests. Some conception of the abundance of these trees in these valleys, and also

of the enormous requisitions annually made by lumbermen upon our pine forests, is shown by the fact already referred to that during the years 1870, 1871 and 1872, the average number of logs banked upon the small streams tributary to the St. Lawrence and Ottawa was over five and one quarter millions annually.

The map which accompanies this report, and which is the joint production of Prof. Robert Bell of the Geological Survey of Canada and the writer, indicates our present knowledge of the northern limits of distribution of the leading forest trees in Ontario, Quebec and the Maritime Provinces. In the projection of this map the sources of information have been largely derived from personal observation of Prof. Bell and the writer, but, in addition, all reliable published lists have been consulted, and access has been had to the private notes of the late Dr. John Bell, Dr. D. MacLagan, of Edinburgh, and others; whilst from Mr. James Richardson, Mr. R. W. Ells, and some other members of the Geological Survey, and from Prof. Macoun, of Belleville, Prof. Bailey and Mr. E. Jack, C. E., of Fredericton, N.B., and Dr. Lawson, of Halifax, N.S., much valuable information has been obtained. Mr. A. J. Russell, of the Crown Timber Office, Ottawa, has also supplied some data connected with the distribution of the pine, besides being the source of some important facts and statistics regarding timber limits and the production of square timber, which have been freely made use of in this report. Possibly, as the country is further explored, the lines indicated on the map may be slightly changed, and some trees may be found of local occurrence—as in the case of the elm, basswood, plane tree and maple—in places considerably north of the limits laid down, and our information regarding the range of trees in Nova Scotia, New Brunswick and Prince Edward's Island is not quite so full as could be desired. The map will, however, be found to fairly represent the northern limits of distribution.

PRESERVATION OF THE TIMBER TREES.

So important is the lumber industry in Canada, that, looked at from a commercial point alone, perhaps no trade question has around it so much of interest as that of the conservation of our

forests with a view to the continuance of that industry. The drain which has been going on for thirty years past on the resources of these forests has been so enormous and so continued that though it may have contributed largely to swelling our exports, drawing wealth to the country and giving us increased commercial status in other countries, it yet opens up the consideration of how long the supply will last. And if, as is self-evident, under the present system of farming out the public lands, a day is drawing near when the supply will not equal the demand, it behooves us, if possible, to adopt some means to preserve or recuperate these forests. A reference to the accompanying map will convince any one acquainted with the localities—each year extending further northward and westward—where the lumbermen obtain their logs, that the area in which the pine may be expected to be found in fair abundance and accessible at a moderate cost, is not so extensive but that another twenty years of working the timber limits to the extent done for a few years past, will result in a very sensible lessening of our exports of white pine. The lumberman's axe is not, however, the only, or even the greatest drain on the pineries. Forest fires, it is believed, have caused even greater destruction, not only by reason of the vast area ruined, but because that large and small trees are alike consumed, as well the huge trunk which would be suitable for the lumbermen as the smaller trees, which in the course of successive years would also become large enough to attract their attention. The extent of this ruin will be appreciated when it is remembered that not until the pine is about one hundred years old is it of good merchantable size for square timber, and that therefore to replace the pine groves would be the work of towards a century. There is, however, the further important fact that after a forest fire, pines are usually replaced by a growth of birch, poplar, and other trees, though whether the pine gradually asserts its position and overshadowing these in turn replaces them, is a question yet to be settled.

Two very pertinent considerations therefore present themselves :—

First, forest fires and their prevention.

Second, the regulations regarding the sale of timber limits to lumbermen.

FOREST FIRES.

No person who has visited the Saguenay District, the Upper Ottawa, the shores of Lake Superior, and the Albany River Country, can be blind to the fact that forest fires have been a source of vast ruin. Many hundreds of square miles have been laid waste by them, and these fires are generally the result of carelessness or wilful criminality. There are Acts of Parliament in both the Provinces of Quebec (Act of 1870) and Ontario (Act of 1878) laying down regulations for their prevention, and imposing fines for neglect of these regulations; but forest fires continue, and no one appears to be punished. Lumbermen and others are ready to blame the Indians for carelessness in regard to their camp fires, but are not white men more frequently blameable, and with their greater knowledge and intelligence more criminally culpable? The statutes, however, are defective. That for Ontario provides that no person shall start any fire on or near a forest, between the first of April and the first of November, except for the purposes of clearing land, cooking, obtaining warmth, or for some industrial purpose, and then in a very indefinite way goes on to require that when clearing land "every reasonable care and precaution" shall be observed. Now, why should it not be made unlawful to start fires in the woods *at any time of the year* except for such purposes?—and even with the object of clearing land, why should this virtually unrestricted permission be given during the midsummer months, when there is most danger from it and least necessity for it? The Quebec Statute goes a step farther and forbids the starting of any fire at any time whatever except for the above recited purposes, and in cases of clearing of land, makes it unlawful between the 1st July and the 1st September. Now this close period might be very safely extended in both provinces to the period between the 15th June and the 15th September, or even the 1st June and 1st October, without interfering in the slightest degree with the necessities of the settler, and thus the heated term would be entirely passed. Both Acts provide in-

structions in cases of fires required for cooking, warmth or industrial purposes, and the Ontario Act very properly makes it imperative that every person in charge of a drive of timber, survey or exploring party, or any other party requiring camp fires, shall once in each week read and explain to his men the provisions of the Act. The Quebec Act omits this very necessary precaution, necessary because railway and other surveyors are sometimes among the greatest offenders against the Act. The Quebec Act also omits the proviso which the Ontario statute includes, that locomotive engineers shall have their fire boxes properly guarded and their smoke-stacks furnished with screens. Both Acts, however, only impose a penalty of fifty dollars or three months imprisonment if that is not paid, for any infringement of the Act. Now, when such wholesale destruction is often the result, why should the offender receive so light a punishment? Why should not the offence be visited with heavy imprisonment without the option of a fine? Those in charge of drives of timber, surveying parties, &c., should be made personally responsible for the acts in this respect of those under them, under the penalty of a fine, whilst the actual culprit should in all cases be liable to imprisonment. So important is this question of the protection of the forests from fires, not merely to the governments which have the administration of the Crown Lands, and to lumbermen who lease them, and to the bankers who make advances on timber limits, but also to the large number of settlers in the new districts who have been in the past and are liable to be in the future rendered destitute and homeless through these bush fires, that it is suggestive whether it would not be well that every Crown Lands agent or bushranger should be constituted a fire inspector, whose duty should be to enquire into the cause of each bush fire, with a view to the detection and punishment of the offender. As facts now are, the offender is probably in most cases an employee, from whom the amount of the fine could never be collected, and hence there could be no attraction to an informer to go to the large amount of trouble and expense necessary in these distant districts to secure a conviction.

REGULATIONS REGARDING THE SALE OF TIMBER LIMITS TO
LUMBERMEN.

Under the present system timber limits are put up at auction at an upset price and sold to the highest bidder. The buyer by paying an annual fee thereafter and dues on the timber or logs actually cut, can retain the limit in Ontario so long as he complies with the regulations, and in Quebec until 1889. He can in Ontario cut any size of tree, but in Quebec is limited to those over twelve inches. In both provinces the license gives permission to cut trees of any and all kinds without restriction, except on lots which the Government may subsequently sell, when the license is restricted in Ontario to pine. Even if in Quebec a lumberman cuts timber under the twelve inches, there are no fines imposed beyond the possible forfeiture of the license if the Government choose to enforce it. Now the grave objections of this system are that it subjects the public lands to unrestricted waste for just such length of time as the lumberman finds it profitable, without any regard to the future; and, on the other hand, it places the Government in the position of an owner desirous of making the largest possible immediate return, regardless of the impoverishment of his possessions in the near future.

The principle of leasing the timber limits for an indefinite period of time, and of allowing trees of any size or kind to be cut, is hardly defensible. There should be a limit in girth beyond which alone a tree should be considered merchantable. The forests should also at intervals be allowed a long rest to admit of the young trees growing up, and the Government as the lessee, and not the lumberman with his self-interest always at stake, should be the judge of what that rest should be and when it is required. It may be said that timber limits under the present system afford a means of financing, and further that if mill-owners erect expensive saw-mills they should have some certainty that they will always have a source from which in coming years to obtain their logs. It is, however, on the one hand a question whether timber limits with the great uncertainty attached to them about the kind and

quantity of timber on them and their constant exposure to forest fires, form the most advisable class of security for a banker to take, and on the other hand, whilst the mill-owner has some reasonable claim for regard, yet the interests of the country at large must necessarily be paramount to his individual interests and, at any rate, his case is not different from that of every other manufacturer who has in a similar way to provide himself for the future with supplies of raw material. If all timber limits were leased for a limited term only—say for five years—all mill-owners would be placed on terms of equality, and limits would in addition be kept out of the hands of speculators. A result which would almost of necessity also follow the shortening of the term of lease, would be that smaller areas would be purchased. As to the period of rest which should be allowed there is room for discussion. In a paper on the pines, read by Mr. John Langton some years ago before the Literary and Historical Society of Quebec, a table was given showing the estimated rate of growth, and from this it would appear that at 100 years in age, the pine is about fifteen inches in diameter, and that the annual increase between that age and 200 years is very nearly one-fifth of an inch. If this be a correct estimate, twenty-five years would not be too long a respite, as even in that time the trees could not increase to a size sufficient for good square timber, though large enough for saw-logs.

It is asserted that in getting out the larger timber there is a great deal of unnecessary and reckless damage done to the younger trees, which might be prevented by more stringent regulations.

To sum up these conclusions :

1. Limits should only be sold for short periods of time, say for five years, and in smaller areas than in former years has been the practice.
2. No trees of a less girth than fifty inches at a height of twelve inches from the ground should be cut, and heavy penalties should be imposed if they are.
3. On reverting to the Government, each timber limit should be allowed to rest, say at least twenty-five years, to enable the younger trees to attain merchantable size.

4. The strictest regulations should accompany each lease, with a view to preventing damage to, or the destruction of the smaller trees.

The Government, with such regulations might possibly obtain a smaller upset price per square mile at auction for limits, but not necessarily so, as the smaller area sold would enable the lumberman to cut within the shorter time all the merchantable timber. The restriction to cutting such trees as are fifty inches or more in girth, would leave the younger timber standing, and the twenty-five years respite would afford time for this younger timber to attain merchantable size.

The Dominion Government has made an effort to encourage tree culture in Manitoba, by making a free grant of 160 acres of land in the prairie districts to each person who undertakes to plant a portion of the property with trees under specified conditions, but the effort has not met with very much success thus far.

(When compiling the large Map of the Dominion of Canada which was subsequently sent to the Paris Exhibition, the Department of Public Works requested a loan of this Map, and permission to use it in the completion of their own was granted, consequently the lines on both will be found to correspond.)

TIMBER AND ORNAMENTAL TREES FOR THE PROVINCE OF QUEBEC.

BY G. M. DAWSON.

The following list is an attempt at the enumeration of the more important timber and ornamental trees suitable for planting in the Province of Quebec, and more particularly in the vicinity of Montreal. The species are arranged in the several botanical orders, the native species in each being first given and then a selection of these of foreign origin, including all such as are known to succeed, with others which, from their original habitat, appear well adapted for cultivation here, and a few which have been carefully tried but found unsuited to the climate and need

not therefore be again imported. The list makes no pretension to completeness, but it is hoped may elicit much additional information and draw attention to the importance of extensive and varied tree-planting.

The principal cause of the exclusion of many trees elsewhere well known in cultivation is found in the occasional great severity of winter temperature in this Province, and though it may be assumed that trees subject in their native regions to a winter similarly severe will, in most cases, thrive here, it is impossible to foresee in many instances which of the trees naturally inhabiting a warmer or more equable climate will bear the test of ours. This knowledge must in most cases be gained by actual experiment, and thanks to the enterprise of a few who have been working in the matter, we can already note a considerable number of valuable additions to our native *arboretum*.

Apart from the production of valuable timber and the formation of shelter-belts for houses and cultivated land and growth of shade trees, tree-planting deserves to be studied from the point of view of the landscape gardener, who endeavors to vary the monotony generally found in natural woodland by judicious mingling of trees differing in form or unlike in color or texture of branches and foliage. It is especially in this direction that the naturalization of the best varieties of exotic trees becomes important.

Care should be taken in endeavoring to introduce new trees—and especially in the case of those naturally inhabiting more southern latitudes—to obtain the seed or young plants from the northern portion of their range, as these are often found to be much the hardiest. As an example, it may be mentioned that the *Grand Arbor vita*, or “Cedar” of the West coast (*Thuja gigantea*) is stated in Messrs. Ellwanger & Barry’s catalogue to require slight protection at their nurseries in Rochester, N. Y., while I am personally familiar with the fact that this tree grows in the interior of British Columbia in localities subject to extremes of temperature as great as those met with in the Province of Quebec. The specimens found too tender may probably have been derived from the mild region immediately adjacent to the coast of the Pacific.

Many of the Western *Coniferae* would probably succeed here best if grown from British Columbian seed.

In preparing this list, the "Catalogue of the Forest Trees of the United States," by Dr. G. Vasey, has been consulted, with other botanical works. To Mr. C. Gibb the collection of the greater part of the local information is due. In regard to European species which have been tried here, Mr. William Brown, Captain Raynes, Mr. John Archbold, and Mr. Nairn, have furnished valuable notes.

TILIACEÆ.

Tilia Americana, L.—Basswood, American linden. White-wood. Native. A familiar tree of very rapid growth and fine foliage.

Tilia Europea. —European Linden. Mr. W. Brown states that this tree is hardy. Several fine varieties of this species are recognized by gardeners.

SAPINDACEÆ.

Acer Saccharinum, Wang.—Sugar Maple, Rock Maple, Hard Maple. Native. A large and fine tree, yielding a valuable wood.

Acer Dasycarrum, Erhart.—White or Silver Maple, Soft Maple. Native. Of rapid growth, and a fine ornamental tree. The several ornamental varieties of this tree distinguished by gardeners would probably also prove suitable to this climate.

Acer Rubrum, L.—Red, or Swamp Maple. Native. A small tree, turning crimson in early Autumn.

Acer Platanoides, Willd.—Norway Maple. A large and fine tree; hardy, and succeeds well.

Acer Pseudo-platanus —European Sycamore Maple. Grows rapidly, but kills back. If kept growing very slowly for a few years it is thought it might succeed in sheltered places.

Acer Compestre, Willd.—English, or Cork-barked Maple. Grows as a shrub. Not quite hardy.

Acer Macrophyllum, Pursh.—Large leaved Maple, Oregon Maple. Probably not hardy enough, but worth trying. Grows on the west coast to latitude 51°. A picturesque tree with short, thick trunk. Grain of wood generally "curled."

Negundo Aceroides, Moench.—Ash-leaved Maple. Bot elder. Grows very rapidly to a height of about 30 feet, forming a small but handsome tree. The foliage resembles that of the ash. Wood said to be fine and close grained. Sugar is made from the sap in the North-West. Quite hardy.

Æsculus Hippocartanum, L.—Common Horse-Chestnut. A fine ornamental tree. Hardy, but somewhat unreliable. Some of the finer grafted varieties are occasionally injured by frost.

ANICARDACEÆ.

Rhus typhina, L.—Sumach, staghorn sumach, native. Grows to 30 feet in height. Twigs used in tanning.

LEGUMINOSÆ.

Robinia pseudacacia, L.—Common locust, acacia. A fine ornamental tree with beautiful blossoms. Hardy.

Rubinia viscosa, Vent.—Clammy locust, gum, or rose-flowering acacia. A small ornamental tree. Grows well.

The Laburnum (*Cytisus laburnum*) has been well tried but is not hardy.

Gymnocladus Canadensis, Lam.—Kentucky coffee-tree. Is about 40 years old. Kills back slightly, but this has rather improved its appearance by causing it to form a compact head.

ROSACEÆ.

Prunus Americana, Marsh.—Wild yellow or red plum. Native. A small tree sometimes 20 feet high. Ornamental when in blossom.

Prunus Pennsylvanica, L.—Wild red cherry. Native. Tree 20 feet to 30 feet high when well grown.

- Prunus Avium*, W. (?)—European cherry. A double flowering variety. Has proved quite hardy with Mr. W. Brown, and is very ornamental.
- Prunus Serotina*, Ehrhart.—Wild black cherry. Native. A fine large tree. Wood valuable for cabinet work. Often disfigured by caterpillars.
- Pyrus Americana*, D. C.—American Mountain Ash. Native. A small tree.
- Pyrus Aucuparia* —European mountain ash. Rowan. A handsome tree, said to be affected by borers, but perfectly hardy. The varieties of this tree distinguished as *quercifolia* and *pendula*, or the oak-leaved and weeping mountain ash, are equally hardy, but rather slow growers.
- Cratægus Coccinea*, L.—Scarlet-fruited thorn. Haw. Native. A low tree.
- Cratægus Tomentosa*, L.—Black or Pear Thorn. Pear or apple haw. Native, in several varieties, some of which are handsome small trees.
- Cratægus Oxyacantha*, E. B.—English Hawthorn, common thorn, hardy. The single scarlet variety is also said to be hardy. Mr. W. Brown states that the double varieties are not quite hardy.
- Amalanchier Canadensis*, T.—Service-berry. Le Paire. Shad-bush. June berry. Native. Usually a small graceful tree.
- Amalanchier Alnifolius*, Nutt.—Western Service-berry; resembles the last. Doubtless hardy tree.

BIGONIACEÆ.

- Catalpa Biginioides*, Walt.—Catalpa. A native of the Southern States, with strong flowers and fine foliage. Might be worth trying, as it is said to show a peculiar fitness to adapt itself to a northern habitat, and to be as hardy as the native trees in Iowa. Wood very durable and strong; excellent for posts.

ALEACEÆ.

Fraxinus Americana, L.—White Ash. Native. A large and handsome tree.

Fraxinus Viridis, Michx.—Green Ash. A small or middle-sized tree of rapid growth. Wood said to be as good as that of the White Ash. Probably hardy.

Fraxinus Sambucifolia, Tam.—Black Ash. Swamp Ash. Native. A medium-sized tree. Wood very elastic, and used in making baskets, hoops, &c.

Fraxinus Quadrangulata, Michx.—Blue Ash. Western States. A large tree yielding excellent wood. Probably hardy.

Fraxinus Excelsior, Willd.—European Ash. A tall tree of rapid growth, and rather more compact than the native. Perfectly hardy. The variety *pendula* or Weeping European Ash has proved equally hardy near Montreal.

URTICACEÆ.

Ulmus Americana, L.—White Elm, American. Native. A large and well known ornamental tree.

Ulmus Fulva, Michx.—Slippery-Elm, Red Elm. Native. A medium-sized tree, not so ornamental as the last.

Ulmus Racemosa, Thomas.—Corky-White Elm. Native. Resembles the White Elm, but with corky rings on the smaller branches. Probably hardy.

Ulmus Campestris, L.—English Elm. The variety of this species known as *Suberosa*, or the English cork-barked Elm, has proved hardy. The ordinary variety would probably also succeed.

Ulmus Montana, Willd.—Scotch or Wych Elm. It is said that this tree has done fairly, but seems somewhat uncertain.

PLATANACEÆ.

Platanus occidentalis, L.—American Plane or Sycamore. Basswood. Native. A well-known tree, growing to a great size in good soil, but yielding a timber of comparatively little value.

JUGLANDACEÆ.

Juglans Cineria, L.—Butternut, White-Walnut. Native. When well grown, a handsome tree with wide-spreading branches. Wood of some value.

Juglans Nigra, L.—Black Walnut. A large and fine tree, yielding a valuable wood. One specimen has been growing for forty years and proves hardy.

Juglans Regia, Willd.—European or English Walnut. A rapid grower but kills back. Not hardy. Might succeed in spots particularly well sheltered.

Carya Alba, Nutt.—Shell-bark Hickory. Sweet Hickory. Native. A tall tree when well grown, affording a very valuable wood.

Carya Amara, Nutt.—Bitter-nut or Swamp Hickory. Native. A tall fine tree. Wood not so valuable as that of the last.

Carya Tomentosa, Nutt.—Mocker-Nut. White-heart Hickory. Native. A tall tree.

CUPULIFERÆ.

Quercus Alba, L.—White Oak. Native. A well known tree, attaining a large size and yielding a strong and durable wood.

Quercus Rubra, L.—Red Oak. Native. One of our largest trees, grows fast, but the wood is of comparatively little value.

Quercus Coccinea, Wang.—Scarlet Oak. Native. A large tree; turning scarlet in autumn.

Quercus Macrocarpa, Michx.—Bur Oak, Over-cup or Mossy-cup White Oak. A large tree, of rounded or spreading form and beautiful foliage. Grows pretty fast, but yields a somewhat inferior wood, quite hardy. Native in the Western States and Manitoba.

Quercus Robur, Willd.—English Oak. A well-known tree. Hardy in sheltered situations.

Quercus Cerris, Willd.—Turkey Oak. A native of the South of Europe. Hardy, but grows very slowly and small.

Fagus Ferruginea, Ait.—Beech. Native. A well-known fine and lofty tree, producing a useful wood.

Fagus Sylvatica, Willd.—European Beech. Mr. Wm. Brown states that all the varieties of this tree which he has tried except the purple-leaved, are hardy. Mr. C. Gibb notes having seen a tree of the copper-leaved variety fifteen years planted and apparently quite hardy, in a sheltered situation.

Carpinus Americana, Michx.—Ironwood. Hornbeam. Blue Beech. Native. A small tree, reaching twenty feet in height; white hard wood, ornamental.

Carpinus Betulis—European Hornbeam. Quite hardy, but of slow growth; with the above generally used for hedges.

BETULACEÆ.

Betula Alba, Var. *Populifolia*, Spach.—American White Birch. Native. A small and slender graceful tree.

Betula Papyracea, Ait.—Paper Birch, Canoe Birch. Native. A handsome large tree with fine grained wood.

Betula Excelsa, Ait.—Yellow Birch. Native. Tree forty to sixty feet high.

Betula Lenta, L.—Black Birch, Cherry Birch. Native. A rather large tree, graceful foliage. Wood fine grained and useful.

Betula Nana, L.—Dwarf or Alpine Birch. A very small tree. Doubtless hardy.

Betula Alba, Willd.—European White Birch. A very handsome tree, with slender branches, which become drooping with age. The variety *pendula lacinata*, or cut-leaved birch, is feathery, graceful, most ornamental, and perfectly hardy. Variety *pendula* also hardy.

Alnus Incana, Willd.—Speckled Alder, common Alder. Native. In general only a bush. Sometimes twenty feet high.

Alnus Glutinosa, Willd.—European Alder. A fast-growing, small or medium sized tree, suited to damp situations, ornamental, holding its seed during the winter. Quite hardy.

Alnus Oregona, Nutt.—Oregon Alder. Becomes a large tree under favorable circumstances. Worth trying.

SALICACEÆ.

Salix Nigra, Marshall.—Black Willow. Native? Probably quite hardy. A swell tree.

Salix Alba, L.—European White Willow. Grows fast to a height of 40 feet. Hardy.

Salix Vitellina.—Golden Willow. Europe. A fast grower and handsome, with yellow branches. Reaches a height of 50 to 80 feet. Hardy. A variety of the last.

Salix Babylonica, Willd.—Babylonian, or Weeping Willow, has been grown in some sheltered places to an age of ten or twelve years, and height of ten or twelve feet. They have usually been wrapped in straw during winter, but have in some cases stood a winter without wrapping. They die suddenly, seemingly from some extreme of temperature.

Salix ———?—English Weeping Willow. More stout in twig and leaf than the last, but also tender.

Salix Caprea, Willd.—Var *pendula* —Kilmarnock Weeping Willow. A tree with peculiar and graceful form. Quite hardy.

Salix purpurea var *pendula*.—American Weeping or Fountain Willow, is said to be hardier than the Babylonian Weeping Willow, and may probably succeed. It is probably this variety to which Mr. Brown refers as quite hardy. The Wisconsin Weeping Willow is perfectly hardy in Wisconsin. It droops, however, rather than trails, as the *Babylonica* does.

Populus tremuloides, Michx.—American aspen. Native, a pretty tree, 20 to 30 feet high.

Populus grandidentata, Michx.—Great-toothed aspen. Native, a larger tree than the last.

Populus balsamifera, L.—Balsam poplar, tacamahac. Native. The variety *Candicans* is known as the Balm of Gilead. Trees of rapid luxuriant growth.

Populus monilifera, Ait.—Cottonwood, abundant westward, particularly along river-banks in the prairie regions. Wood light and soft, much employed in the West for inside work of houses, under the names of whitewood and cottonwood. It is probably a variety of this species which is known on the Missouri as the yellow cottonwood, and said to afford a superior wood. Doubtless quite hardy.

Populus alba, Willd.—White or silver poplar, or silver abele. A tree of wonderfully rapid growth, and ornamental, but produces many suckers.

Populus fastigata, —Lombardy poplar. Attains a height of over 100 feet. Grows rapidly, and very useful in breaking the monotony of the rounded outlines of other trees with its tall spire.

CONIFERÆ.

Pinus Strobus, L.—White pine, Weymouth pine. Native. A well-known tree, the most ornamental of the native pines. Grows fast even in poor soils.

Pinus Banksiana, Lamb.—Banksian pine, scrub pine. Quite hardy. Not highly ornamental. Trees scarcely large enough to afford good lumber.

Pinus resinosa, Ait.—Red pine. Native. Tree 50 to 80 feet high, producing excellent wood.

Pinus mitis, Michx.—Yellow pine. A fine tree, native in the Eastern United States. 50 to 60 feet high. Timber durable and much esteemed. Probably hardy.

- Pinus Contorta*, Deryl.—Twisted Pine. Western Scrub Pine. A low straggling tree on the Pacific coast, but the mountain varieties *Latifolia*, *Bolanderi*, etc., are tall symmetrical trees of rather scanty foliage, but rapid growth. Doubtless hardy; reaches latitude 63° in the interior of Alaska.
- Pinus Ponderosa*, Deryl.—Yellow Pine. Heavy-wooded Pine. Pitch Pine. Grows in the dry interior region of the Pacific slope, northward into British Columbia. A very fine tree, with leaves 8 inches long; often over 100 feet high. Grows rapidly. Yields lumber of fair quality. Doubtless hardy. Should have a dry situation.
- Pinus Flexilis* and *P. Albicaulis*.—Ball Pine and White-barked Pine. These trees are much alike, and perhaps constitute a single species. Mountains of the Pacific coast. Doubtless hardy.
- Pinus Benthamiana*.—Bentham's Pine. A west coast species of magnificent growth, and with very long leaves. Probably hardy.
- Pinus Lambertiana*, Dong.—Sugar Pine. Lambert's Pine. Mountains of the Pacific coast. Attains a height of over 200 feet, and yields excellent timber. Bears very large and handsome cones. Probably hardy.
- Pinus Monticola*, Deryl.—Soft Pine. Little Sugar Pine. Western White Pine. Mountains of the Pacific coast. A fine tree, yielding good lumber. Reaches a height nearly as great as the last, and bears long pendent cones. Doubtless hardy.
- Pinus Austriaca*.—Austrian Pine. A fine robust tree of rapid growth, and handsome form. Has proved quite hardy.
- Pinus Sylvestris*, Willd.—Scotch Pine or Fir. A fine robust tree. Quite hardy, and grows as fast as the White Pine.
- Pinus Excelsa*, .—Of the mountains of Northern India. May be worth trying.
- Pinus Cembra*, Willd.—Swiss stone Pine. A compact, conical tree. Quite hardy, according to Mr. Brown.

Pinus Pinaster, Willd.—Cluster Pine. Native of S. Europe. Quite hardy, according to Mr. Brown.

Pinus Pinea, Willd.—Stone Pine. Also a native of S. Europe, and said to be quite hardy by Mr. Brown.

Abies Alba, Michx.—White Spruce. Native. A well-known tree, generally small, but symmetrical.

Abies Nigra, Poir.—Black Spruce. Native. A much larger tree than the last when growing in favorable situations.

Abies balsamea, Marshall.—Balsam Fir. Native. A handsome tree from 20 to 40 feet high.

Abies Canadensis, Michx.—Hemlock. Native. A well-known tree. The most graceful of Spruces, with light-spreading foliage. Makes a beautiful hedge.

Abies Mertensiana, Lind.—Western Hemlock. Native of the Pacific coast. Resembles the common hemlock, but grows much larger. Probably hardy.

Abies Douglasii, Lind.—Douglas Fir. Native of the Pacific coast. A fine tree, reaching occasionally a height of over 300 feet, with a diameter of trunk of 8 or 10 feet. Valuable timber. Doubtless quite hardy.

Abies Menziesii, Dougl.—Menzies Spruce. A species of the Pacific coast. Reaches a height of 200 feet. Wood valuable, of symmetrical pyramidal form when young. Probably hardy. Trees grown from Californian seed would not stand in Boston. Those grown from Colorado seed did well in N. Illinois and the West.

Abies Engelmanni, Parry.—Engelmann's Spruce. Native of the Pacific slope. Resembles the last in size when well grown. Produces a valuable wood. Doubtless quite hardy. Has proved hardy at St. Petersburg, Russia.

Abies grandis, Lind.—White Silver Fir. A tree of the Pacific coast; reaches a great size. Perhaps hardy.

- Abies larioarpa*, Hook.—Much resembles the other, but has not been observed to attain so great a size. Handsome, bluish-green, glossy foliage. Common at a considerable altitude in the interior of British Columbia, and doubtless hardy here.
- Abies Amabilis*, Dougl.—Red Silver Fir. Pacific coast. A large and very beautiful tree. Probably hardy.
- Abies nobilis*, Lind.—The Noble Fir. Pacific coast. A majestic tree. Probably hardy.
- Abies excelsa*, —Norway spruce. A lofty tree with drooping branches. Grows rapidly, and quite hardy.
- Larix Americana*, Michx.—American Larch, Tamarac. A well-known native tree of slender habit.
- Larix Occidentalis*, Nutt.—Western Larch. A much larger tree than the above, growing in the mountains of the Pacific slope. Doubtless hardy.
- Larix Europæa*, —European Larch. A handsomer tree than *L. Americana*. Has proved quite hardy and outgrows the native, but is not long lived. Variety *pendula*, very graceful, with long drooping twigs.
- Thuja Occidentalis*, L.—American Arbor Vitæ, white cedar. Native, a well-known tree, reaching a height of 30 to 50 feet.
- Thuja gigantea*, Nutt.—Giant Arbor Vitæ. Western Cedar. Native of the Pacific slope. Reaches occasionally a height of 200 feet, with a diameter of trunk of 10 or 15 feet. Doubtless hardy, at least in some varieties, as it inhabits parts of the interior of British Columbia where the climate is very severe.
- Thuja Orientalis*, Willd.—The Chinese Arbor Vitæ. Well-known in European gardens. Mr. Brown states that this tree is not far from hardy, but still proves too tender for this Province, being eventually winter-killed.

Cupressus Nutkanus, Hook.—Nootka Sound Cyprus. A fine tree with bluish-green foliage. Very desirable if hardy. Worth trying.

Cupressus thyoides, L.—White Cedar. Found native about 80 miles west of Montreal, according to Mr. Brown, also occasionally about the Great Lakes. Grows generally in swamps. Probably quite hardy.

Juniperus Virginiana, L.—Red Cedar. Probably hardy.

Juniperus Sabina, Willd.—Savin Juniper. A dwarf spreading shrub with trailing branches. Handsome foliage. Has proved quite hardy. Native of S. Europe.

Juniperus Communis, Willd.—English Juniper. A handsome small tree, perhaps hardy. It is found that the variety *Hibernica* must be covered in winter. Var. *Suecica*. Swedish Juniper. A small pyramidal tree. Quite hardy according to Mr. Brown.

Taxus Baccata, Willd.—Var. *Fastigata*. Irish Yew. Mr. Brown has found this tree tender, but thinks it might survive if carefully wrapped in winter. The same remark will probably apply to other varieties of the English Yew.

Cedrus Deodara —Deodar, or Indian Cedar. Mr. William Brown imported about fifty of these, but they proved too tender.

Cedrus Libani, Willd.—Cedar of Lebanon. Mr. Brown has also tried a number of these, but they were winter-killed, and never reached a height of more than two feet.

Cryptomeria Japonica —Japan Cedar. This beautiful tree is also too tender, according to Mr. Brown.

Salisburia Adiantifolia, L. T.—Maiden Hair Tree, or Ginko ; also tried by Mr. Brown, but quite too tender for this Province.

SUGGESTIONS REGARDING THE STRUCTURE OF THE APPLE.

BY HENRY M. SEELY, OF MIDDLEBURY COLLEGE, MIDDLEBURY,
VERMONT.

At an agricultural meeting in which the relation of the leaf to the fruit was a portion of one of the topics discussed, Dr. T. H. Hoskins enquired how the apple could be regarded as coming from a leaf or from a cluster of leaves. The question was answered only in part at the time, but gave rise to the observations on which the following thoughts are founded. I have not been able to consult authorities, but as opportunities have permitted, have watched with interest the growth of the fruit of the apple tree. Without being able at this time to offer observations at all complete, I do venture to make some suggestions, which perhaps had better be styled guesses, as to the possible structure of the fruit.

The very aspect of an apple tree will indicate whether it has yet come into bearing. The straight or gently curving branches of the symmetrical young tree become spurred, angular and irregular on the fruiting tree. The round full countenance of youth is no more surely changed by thought and responsibility than the shape and beauty of a tree by the crop it bears.

The buds at the falling of the leaves in autumn, disclose the possible crop of the succeeding year. Their size and position will not mislead a practical eye. Destruction of all promise of fruit may come from conditions both within and without the tree, but the germs of the crop are already established in the bud, and only favorable conditions are needed to secure a full yield.

It would be a most interesting study to follow the growth of the flowering bud from its first inception; that however is not the purpose of the present writing.

The flower bud of the apple opens and discloses five small flower stalks standing among the leaves and surrounding a sixth stalk a little longer than the others. Each of these is tipped with

its little globe, which will soon open an exquisite world of color, beauty, and fragrance, to the greater world around. The five surrounding flower stalks have been developed from buds standing in the axils of incipient leaves, while the central bud represents a growth from a terminal bud.

Each flower stalk will have along its sides bracts, leaves in miniature, and theoretically buds in the axils of these; but it is the terminal bud alone that in this case develops into a flower. So a rosette of six flowers, each flower tipping its own stalk or branch, bursts from each flower bud. On examining the upper part of the flower stalk, it is observed to swell out, perhaps from the increase of the material of the stem, or from the union of the bases of the rows of organs which represent leaves.

The rich juices of the tree are pushed up into the stems of the flowers, the delicate spheres of petals enlarge and break open, and the sweet sap going to the blossom in larger quantities than can be assimilated, escapes in part as nectar, making a wilderness of delight for the honey bee.

The petals, unfolding, find their place at the angles of the limbs of the calyx, and stand upon their own short stalks. Within this circle the filaments of the stamens arrange themselves in two not very distinct whorls of ten each; in all twenty. The anthers are fixed by the back, and opening along the sides, drop out the oval, yellowish grains of pollen. The centre of the flower is a whorl of five organs condensed into a column below, while each is tipped by a knob above.

Beginning at the border of the flower and counting toward the centre, we have first a whorl of five organs, representatives of leaves forming the calyx; next five others standing at the angles formed by the limbs of the calyx and alternating with the first five, the corolla; then twenty thread-form organs, mostly alike, crowding in a double row, the stamens; and lastly the compressed and almost consolidated five similar organs composing the pistil. Down at the centre of the last circle there is theoretically a terminal bud. So standing round and guarding this ideal bud are seven whorls of ideal leaves each, and we shall not be far

astray when we consider each apple blossom as made up of a rosette of thirty-five leaves.

The development of this blossom into fruit we may perhaps consider in this way: while the ideal terminal bud does not grow, nor the branch along which these leaves of the flower are attached lengthen, still circulation continues and material for growth accumulates, and this material is stowed away mostly in the bases of the consolidated organs representing leaves. These bases become very vascular, and remain fresh through all the history of the apple.

In a few days after flowering the delicate petals break away at the point where their bases coalesced with the outer whorl the calyx, and have a permanent year. The author cells shrivel and the filaments of the stamens slowly dry from the top to the point of their insertion. The stigma and upper part of the style darken and dry. Only the petals and empty author cells really fall away, but circulation ceases in all portions of organs that are to take no further part in the production of the fruit, and for this production everything now seems ready.

Unless the tree is wonderfully vigorous there is not enough nourishment for all the young apples set upon it. Those on the outer row will feel the lack of nutriment first; the limbs of the calyx will roll back, the incipient apple will wither and soon fall, and this fall may be accompanied or followed by the other four, leaving only the central one to mature. The growth perhaps now most noticeable is that seen near the limbs of the calyx, which before reflexed now straighten, then approach and then tenderly and permanently embrace the stamens and pistil. The young apple is irregular near the calyx and angular throughout. The projecting calyx is made prominent for weeks as the growth goes on, and while the stem retains its normal position as to insertion it has dropped its fruits, and now has a clean stalk.

The sap goes on, and into the swelling, green globe of the apple; the breadth after a little increases more rapidly than the length, and the projecting calyx and insertion of the stem apparently retreat into depressions formed by the rapidly growing

diameter of the apple. The skin of the growing fruit no doubt performs the functions of a leaf. The chemical changes which go forward from the time the petals drop, to that when the fruit falls back in decay to its original constituents, is a study of itself, and must be passed here with the bare assertion that the apple becomes a laboratory in which materials are stored and wrought over and re-wrought until most wonderful compounds are perfected. The work goes on until sight, touch, smell, all tempt the taste, all invite to partake of the delicious autumn fruit, which has developed from the delicate spring flower.

But before the fruit matures preparation is made for the separation of the stem of the apple from the limb on which it is borne. The stem perhaps, like the limbs of some of the poplars, makes a natural amputation. In the case of the poplar, an enlargement appears near the junction with the larger limb; probably there is a partial arrest of circulation and a drying up of a circle of cells, then a sudden whisk of wind, and the superfluous branch falls to the ground.

The separation of the apple from the branch does not at the ordinary temperature prevent the progress of chemical and physical changes. The woody cells sooner or later soften, the contents change, the skin changes as the maturing leaves change to red or yellow, while not unfrequently a waxy coating polishes the outer surface. A delicate aroma varying with the variety now escapes, and heralds the news of the ripening through the air round about.

If the invitation which the aroma extends to man and animal to partake of the delicious morsel is not accepted, and the seeds loosened by such means from their imprisonment, the fruit proceeds to secure their release by breaking down its own structure—dropping down into decay; the woody tissue throughout the cellular mass becoming disintegrated, the contents of the cells running together and becoming liquid; then the slightest external violence loosens the seeds from their cells, or the attack may come from without, as a green mould, which finding or making a place in the skin, induces decay that spreads like a cancer through the whole body.

So by violence of man or animals, or the attacks of fungi, or chemical changes within, the divisions of the ovary, which while the germs were immature, were as the walls of a fort for protection, now, when ripe are as the walls of a dungeon, are broken away and the seeds liberated: liberated to germinate and in good time to grow into trees which shall bear fruit after their kind, and thus complete the cycle of growth.

Before dismissing the subject, there are some points in the anatomical structure of the apple that are worthy of thought. Observing the outside of some varieties, Tallman's Secret for instance, five lines may often be seen radiating from the stem which in rare cases may be traced quite to the calyx. Have we not in these lines an indication of the original external structure of the apple? Looking at the cavity in which the limbs of the calyx stand, it will be seen that the cup is corrugated or plaited, having five or twice that number of ridges. When the number is five, it will be found that each ridge terminates in the middle of the limb of the calyx, along a line where the midrib would naturally be; in case the number be ten, every alternate ridge terminates at the edge of a calyx limb, or in other words at the point where a petal stood at the time of flowering.

If the apple be cut open from calyx to stem through the middle of a ridge, there will be found a bundle of spiral vessels looking like a thread, sweeping along in an irregular half-circle, the other end of the thread coalescing with vessels that enter the stem. Cutting down in a similar way between the limbs of the calyx a similar thread will be hit upon, the origin of which seems to be lower down and at the place where the stamens stood, and apparently formed by the union of their bases with perhaps a portion of the midrib of a petal.

If a slice is made in the opposite direction just at the insertion of the calyx, taking off a piece, there will appear a circle having for a centre an opening not round but shaped like a star with five blunt points. Cutting a second slice the star will go with it, and in the centre of the part left there will be a hollow inverted cone, standing in the apex of which will be a column formed by the upper part of the pistil. Cutting still another slice an incipient

star may be noticed, and again after another cut, a complete star usually disclosing at the base of the rays two seeds in each cell. At a distance from the point of each ray in the fleshy part of the apple will be seen the second bundle of spiral vessels, and midway between two of these will appear another, and these altogether will make ten. A dissection may be made, and running from the stem to the calyx will be found these ten threads forming a row around the core, five of which terminate in the middle of the midrib of a calyx limb and five near the scar point left by the falling petal.

Based upon the foregoing observations, the following suggestions are offered:—The apple is the result of the modification and maturing of organs representing leaves. The parts of the calyx give the covering of the apple, the skin corresponding to the epidermis on the lower side of the five united leaves. The ridges in the calyx cavity indicate the position of the midrib of each leaf; the actual midrib however lies much deeper, and is represented by the thread or band of vessels that reaches from the middle of the calyx limb to the stem, while the intermediate five bands may result from the coalescence of similar parts of the stamens with the midribs of the unfallen portion of the petals.

The portion then of the apple which lies between the skin and the row of ten vessels corresponds to the under side of united leaves, which leaves have been wonderfully increased by the development of woody framework and the engorgement of the spaces with cellular material. The part between the ten vessels and the core is made up of the upper portion of the same leaves together with the under side of the five leaves which are modified to form the core. The smooth inner part of the core enclosing the seeds corresponds to the modified upper surface of the last whorl of leaves, the edges of which rolling in upon each other and forming the placenta, bear each one or more germs that mature as seeds.

As in the blossom we recognized whorls of organs, representatives of leaves, one set of which constituted the pistil, four the stamens, one the corolla, and one the calyx, or seven whorls of five leaves each, so in the fruit we have the development and maturing of the bases of these same leaves: thirty-five leaves are rolled into a single ball, and that ball we call an apple.

APPLES—WHAT NOT TO PLANT AND HOW TO PLANT.

BY ANNIE L. JACK, CHATEAUGUAY BASIN.

Some twenty years ago an orchard was planted within sight of my writing, which presents so distinct a difference in its growth as to be noticed by even a passing observer. I will give the experience of the orchardist for the benefit of readers.

The half which grows so thrifty and brings in a regular paying crop is altogether Fameuse. The orchard was all planted at the same time, and set as to trees 24 by 27, and 24 feet apart each way.

The half which consists of knotty, gnarled, or replanted trees, had the best soil, equal drainage, and the same kind of treatment and care. But the mania for variety is hard to withstand, and has a peculiar fascination for a beginner. So we set in, with many bright hopes, Bell Flower, Ripstone Pippin, Gloria Mundi, Early Harvest, Pomme Grise, Bourassa, Greenings, Hashcrnden, and many other tender varieties, the number being at least twenty. As time passed the Fameuses became too dense, and proved that they needed a few more feet of ground, but they still bear a crop of apples, and repay the labor, while the *fancy* half has grown wide apart in bearing trees, and it is no unusual experience in spring to have to root out forty or fifty dead trees that have *never borne a barrel of apples*, while the first idea of a stranger is that they are younger than the Fameuse. It was a serious mistake, but one into which many orchardists fall, and proves the value of the Fruit Growers' Association, who take pains to test and report on varieties suitable to the climate. As a result of experience, the orchardist mentioned, when setting out an orchard of over a thousand trees two years ago, restricted himself to four varieties, that have proved remunerative. They are Fameuse, Alexanders, Red Astrachan, and Duchess of Oldenburg.

In planting the first orchard by the old method of digging holes an average of three feet square, the trees (after thorough preparation of the land) cost ten cents each for the simple planting. In

the orchard lately planted, the ground, being drained and prepared early in autumn, was laid off into the rows for trees by ploughing out three furrows each way, which in itself forms the rows in which depth for the roots, which require width rather than depth, the trees are to be planted, and this was found of sufficient depth in which to spread their rootlets. Notwithstanding a very dry season, the result has been satisfactory, and the fall-ploughed land is always mellow and better able to resist drouth than if freshly turned over, while it falls in among the fibrous roots of the trees in fine condition. The cost of the latter method of planting was, all labor counted, only four cents each, a saving of six cents per tree over the old laborious plan. This is in itself quite an item in planting a large orchard, and has proved successful in this case. With trees suitable for the climate, a well drained field, (for the apple tree is averse to wet feet), and careful planting, there is no reason why every farmer should not enjoy this healthful and favorite fruit. But the planting must be carefully done, the after culture, and fight with numerous insects a regular duty, if we would secure the finest fruit.

“ Wide let its hollow bed be made !
 There gently lay the roots, and there
 Sift the dark mould with kindly care,
 And press it o’er them tenderly.
 As, round the sleeping infant’s feet,
 We softly fold the cradle sheet,
 So plant we the apple tree.”

A NEW PLUM FOR COLD CLIMATES.

BY P. G. BURKE, OTTAWA.

The word seedling has a dull, dead ring about it, and it is only when a thing has been thoroughly tested and named that it can be disposed of as a market commodity.

I am glad to be able to draw special attention to a new plum now known here as the “Greenfield,” having been raised by a

gentleman of that name from some stones of the Magnum Bonum received from England several years ago. About twenty seedlings were raised, of more or less merit, but the one above named is of more than ordinary excellence, both as regards the size and quality of its fruit, and also as to the hardiness of its wood. The fruit much resembles its parent, is a large-sized red plum, and is a most abundant bearer. It has now been fruited for three years, and may therefore be considered as thoroughly tested.

Its fruit ripens about the 15th August. A few grafts have been sent to the Gilcrist nurseries at Guelph this spring for the purpose of propagation. I made a careful examination of these, and found on picking off some buds with the thumbnail that they were fresh and green into the bark, and that the wood was perfectly sound to the very tip of the twig. If hardy apples get the name of iron-clads, this plum may safely be called a steel-clad, especially when we come to remember the severity of the winter we have just passed through; the oldest inhabitant cannot remember so steady and severe an uninterrupted cold "spell," unbroken as it was by any attempt of the remotest kind to a January thaw. In the hands of a skilful propagator, this plum might be disseminated about the coldest districts of the Dominion, and would hold its own among many red kinds now on the market; and as a canning or preserving fruit is fully equal to any I know. For some reason the blue plum takes best on the market in the same way that white currants will hardly sell where red are exposed for sale, and white grapes are more quickly purchased than purple or copper-colored. What gives the choice of color to purchasers it would be hard to tell, but certainly excellence does not by any means follow the popular color; green or white grapes seldom equal the red and dark in flavor, and everyone knows that has tried the two that the white grape currants are far in advance of the red varieties in sweetness and other qualities for which this fruit is esteemed.

With regard to the Greenfield plum, I can only say there is none for sale, as at present there is only the one tree, (more is the pity), that I am not in the nursery business, and that what I

have written is solely from the conviction that what I state is correct.

The time of ripening of this plum is too early for our provincial exhibition, but I propose to preserve some in glycerine, so that the size and general appearance may be on view here during the show week. So far this plum has not been attacked by black knot curculio, or any other disease that plums are heir to.

PLUMS TRIED AT THE MARCHMONT NURSERIES.

BY WILLIAM BROWN, MONTREAL.

When these gardens were first started, about thirty-three years since, I spared no pains or expense in testing many hundred varieties of fruit trees. I have been requested by the Society to say what my experience has been with Plums. Though unwilling to say anything which may discourage others who desire to experiment in the same direction, I have to confess that my experience has been the reverse of encouraging. I planted some thousands of trees, embracing nearly all the varieties on the lists, and procuring the trees from France, the United States, Scotland, &c. I had one orchard of apple trees planted alternately with plums. The plums are now nearly all gone—the apples (many of them the Emperor Alexander) remain, and are now large trees in full bearing. I had a really heavy crop only one year. The preceding winter had been comparatively mild. A degree of cold about twenty-two to twenty-five kills the fruit buds of the plum, at least all the fine budded sorts. My trees that year were really a splendid sight, all loaded to breaking. If my memory serves me, they were visited by Mr. Lowe (now of Ottawa), who was so much struck with the richness and luxuriance of the sight of so many sorts of this delicious fruit in full bearing, that he wrote a pretty full account of it for the *Gazette*. I had a few other years' crops, but none like the one I now refer to. For three or four years in succession, we would hardly see a plum. After very severe winters we might

pick a few from branches which had been covered with snow. Severe cold, the curculio, and the black knot, are the enemies of the plum. The winter's frost of course we could not combat. The black knot did not give us much trouble—it attacked principally trees suffered to grow in grass or rank herbage. We tried many experiments to eradicate it by using the knife freely, but without success. My trees did best, and yielded the finest fruit in the heavy soil. Taking everything into consideration, I am inclined to yield the prize to CORSE'S *NOTA BENE*. It was so regular in bearing, so very prolific, and of such excellent quality, that I think it should be at the top of the list for our climate. I had a sort, the *LONG SCARLET*, considerably hardier; in fact, it proved the hardiest tree in my collection—but it was not so enormously productive as the *Nota Bene*, and much inferior to it in flavor. I have often had CORSE'S *ADMIRAL* (a magnificent fruit), in full bearing, but I think the flavor is not so good as the *Nota Bene*. Some years ago, there were a number of new seedlings raised in Scotland. I imported full-sized trees of most of them—the fruit was very fine, but scattered thinly on the branches, and the trees were all eventually destroyed by the frost.

I will now give a list of the sorts I tried. It does not include all, for there are some whose names I have forgotten.

Bleeker's Gage. Gave very heavy crops of excellent fruit for several years. I used to think this and the *Lombard* next to *Nota Bene* in productiveness.

Coe's Golden Drop. Very handsome and valuable for its lateness. It would stop fruiting for quite a number of years. When it did fruit, it was always well loaded. From the character of the wood, and habit of the tree, we used to think it was somewhat hardier than most of the other sorts.

Deane's Purple. Never much fruit from this sort, but what there was of it was very large and fine.

Green Gage. A slow growing sort. Delicious fruit; spreads its branches often near the ground, hence we used to get a little fruit pretty regularly from limbs which had been beneath the snow.

General Hand. Did not succeed in fruiting this.

Goliath. Known by its downy branches. Frequently bore with us. Enormous purple fruit.

Imperial Gage. It ranked amongst our best.

Lombard. Almost equal to *Nota Bene* in productiveness. A very profitable sort. All my trees were *on their own roots*—not budded. It is said to do best in that way.

Smith's Orleans. Is said to be a productive sort, but fruited shyly with me.

Pond's Seedling. A most beautiful late plum of the largest size. I had only a few specimens of the fruit.

Reine Claude de Bayay. I got this delicious sort from France, where, I think, it had just been raised as a seedling.

Sharps' Emperor. Sometimes called *Victoria*. Fruited this sort, and English variety, very large and good.

Jefferson. We could never succeed with this celebrated American variety. It was too shy in bearing. What we had of it was most delicious.

Washington. One of the best, but did not bear heavily.

Huling's Superb. A large green sort. Whether or not it is "superb," I can hardly say, for I do not recollect once seeing the fruit, though I had quite a large tree of ten to twelve years growth.

Yellow Gage. I think this was *Princes' Yellow Gage*. It was one of our most profitable sorts, being a fine bearer.

We planted the following, but they did not live long;—*Guthrie's Apricot, Guthrie's Tay Bank, Guthrie's Aunt Ann, Guthrie's Topaz, Autumn Gage, Jaune Native, Early Orleans, Red Magnum Bonum, Yellow Magnum Bonum, Morocco, Nelson's Victory, Peach Plum, Royal de Tours.*

All these I may pass over without any particular remarks. The *Early Orleans* seemed to me one of the most *delicious* of plums, coming, as I think it did, first in the season.

Cherry Plum. We had numerous crops of this curious little variety from *St. Catherine*; trees about the size of a gooseberry bush. I had a few trees of this sort from Angers, in France. They fruited fairly. It is the sort from which the fine prunes of commerce are made. Could it not be tried again here?

Corse's Nota Bene, Corse's Admiral, Corse's Twins, Corse's Golden Gage, Corse's Dictator. We fruited all these. I have already said that the first-named should be at the head of the list. The *Admiral* is also very fine, and I believe by some growers, is ranked equal, if not before *Nota Bene*. *Corse's Twins*, though curious in its way, being a double plum, is of poor flavor. *Golden Gage* is very fine, but a shy bearer.

Lawrence's Favorite. Among the best and most satisfactory that we tried. It bore heavily.

Long Scarlet. I had two or three full grown trees of this variety.

Ickworth Imperatrice. We fruited this most beautiful English sort to great satisfaction. It is very valuable for this locality, being rather hardy, and the fruit hanging so long on the trees. Probably the best price in the market was got for this variety; we sold it in October.

Denmore's Superb, Diapree Rouge, Downton's Imperatrice, River's Early Favorite, Ghisborn's Early, Lawson's Golden Gage.

I have a good seedling, greenish yellow, quite late, which never gets winter-killed, and fruits more or less every year. It has stubby short-jointed wood. Though it will not compare for flavor and appearance with these fine budded sorts, yet it is upon these native seedlings that we should place most dependence. There are other growers who have these native kinds, which have grown up from stray pits, and many of them I believe superior to the seedling I now mention. I had almost forgotten to say that we fruited quite a number of the *Aloe*, from plants imported from Scotland. Though so hardy on the Scottish hills, it gets killed here above the snow.

THE PLUM.

BY JAMES BROWN.

Some time ago a request was made through one of the city papers for any party having any Corse's Plums to make the fact known, and I now through the medium of the Montreal Horticultural Society have pleasure in stating that I have a few of them, as also some good seedlings which I have raised as under :

CORSE'S ADMIRAL.—A very large dark blue plum of fair quality, the fruit in many instances measuring six inches in circumference (not lengthwise). It ripens about the middle of September. A distinguishing feature of this tree is the peculiar formation of its leaf, the edges all bending down similar to a canoe reversed.

CORSE'S NOTA BENE.—This I consider one of the finest plums—fruit medium sized, very fine flavor, color reddish blue with a fine bloom slightly speckled on one side, and a good bearer.

CORSE'S GREAT BEARER.—This is one of the most prolific plums I have ever seen, generally requiring the branches to be propped up all round to prevent breaking. It is a small plum, light blue in color, of fair flavor, and well deserving of its name. It ripens middle to end of September.

LARGE GREEN GAGE.—The fruit of this plum is above the average size but not first-class in flavor, at least to my taste. The flesh is a greenish yellow and very sweet. Suckers come from this tree very freely. It is not long-lived, but is a good bearer, and the trees begin to carry fruit very young.

I have a seedling yellow plum above the average size, the color of which is very beautiful—a bright yellow, shading to a peachy red, and one of the finest flavors. The flesh is very firm, and the fruit never drops, in fact in pulling them the stalk always adheres to the tree. The tree grows straggling and the fruit in twos and threes, not in clusters, is all over the branches. It is a good bearer

and ripens late. It is unlike either Bolmar's Washington, Hovey's seedling, or the Apricot Plum.

I have a blue plum, not quite so large as the Admiral, of very fine flavor, but a drawback to it is that the flies and the wasps attack the fruit so fiercely that many of them are spoiled. It ripens late.

I have another seedling, a small red plum, one of the most prolific bearers, but not first-rate in flavor. There is one compensation, however—it never fails in bearing, and is very hardy. Its branches are long and very slender and require propping up every year.

I have a good many other kinds, Bolmar's Washington, Marchmont, &c., &c., but Corse's Admiral, Nota Bene, Great Bearer, and the unnamed yellow seedling are my favorites, and Mr. James Morgan's gardener said in regard to the last one "I will try and stick it all round the garden." He was getting some scions for budding, and I hope he has been successful in his efforts.

TOMATOES.

BY MISS A. E. LYMAN.

We often hear of blessings in disguise, but few uninitiated persons would think of looking among the Solonaceæ, or Nightshade family, for some of the greatest boons which the vegetable creation has to bestow upon a hungry world. Stimulant narcotic properties pervade this order of plants, the herbage and fruit of which are mostly deleterious, often violently poisonous, and furnish some of the most active medicines. Yet among the Solanææ, which comprise upwards of four hundred species of plants, we find the Potato, Tobacco, Egg-plant, Cayenne-pepper, and the subject of this paper, the *Lycopersicum esculentum* or Love Apple, commonly called Tomato. This plant is a native of South America, and is now largely cultivated in France, Germany, Italy and the United States, where it may be found upon the table of

almost any day-laborer. In England it becomes a somewhat expensive luxury, being mostly grown under glass, as considerable heat is required to bring the fruit to perfection. But experiments made in the south prove that with care in choosing a sheltered location and southern exposure, it may be cultivated with satisfactory results under the grey British sky.

The Tomato may be grown from cuttings, but the most common and convenient method of propagation is from the seed. In our northern climate the seed should be sown in hot-beds about the last week in March. It may be well just here to speak of the preparation of the hot-bed, as in this lies a great element of success. The most convenient sash for this use is the 3 × 6 foot sash made out of one and a half inch pine. The frame is usually made moveable, in lengths which three sashes will cover, making, when complete, a box-like structure nine feet long and six feet wide. In order that the sashes should be at a sufficient angle to receive the sun's rays and to throw off the rain, the lowest side of the frame may be sixteen inches high, while the highest should be not less than two feet. The best heating material is horse manure, fresh from the stable, mixed in nearly equal quantities with leaves from the wood, or with black muck from the swamp. If leaves are used, they should be previously prepared, being well mixed with the manure in successive layers and formed into a close heap, large enough to ferment during severe winter weather. If this is not accessible at the time of making the hot-bed, ordinary long manure is the next most serviceable material. The best method in our cold climate, where the ground is yet hard frozen in March, is to form a solid bed of the heating material from eighteen to twenty-four inches high, taking care that it is at least a foot each way larger than the frame, which is placed upon it and the sashes put on. In a day or two, it will be found, on plunging a thermometer into the mass, that the temperature has risen to 100° or more. This being too high for the existence of vegetable life, it will be necessary to wait a day or two longer, until the fierce heat subsides to about 85°, when the heating material should be covered with soil to the depth of six

or eight inches. This soil should be carefully prepared of one-third well rotted manure (or rotted refuse hops from a brewery) and two-thirds good loam. When the seed has been sown, cover it with some very light mold; nothing is better than leaf mold and sand in equal parts. After sowing, constant attention must be given to airing, by lifting the sashes during the middle of the day, more or less, as the weather will permit, and to watering with a very fine rose watering pot and tepid water, never allowing the soil to get dry. When the plants attain a height of two or three inches, (usually between six and eight weeks from the time of sowing the seed) they should be replanted in a larger hot-bed, some four to six inches apart, or in small three inch flower-pots, to remain until all danger of frost is past, when they may be transplanted into the open ground. Choose for early crops a light sandy soil, and place the plants at a distance of three feet apart, in hills in which a good shovel-full of well rotted manure has been mixed. On a heavy soil which will bear a larger crop, though later, plant four feet apart. After transplanting, care should be taken in watering and in sheltering from the sun for the first two or three days, until the young plants should be firmly rooted. After they attain a height of about eighteen inches, the branches beginning to droop and before the flower-buds appear, it is well to arrange some support for them as follows:—Undoubtedly the best plan, so far as appearances and the most perfect ripening of the fruit is concerned, is the low trellis over which the branches may be trained like a vine. Another method is the hoop system, adopted in France, but both of these, while possible in a small private garden, require too much time and attention to be available in a market garden. For ordinary purposes, short brush, such as is used for peas, laid upon the ground on each side and close to the plants is a simple, cheap and effective method of supporting the branches, enabling a greater quantity of fruit to come to perfection, both on account of its being kept up from the ground, where it is prevented from ripening evenly, and from attaining a fine color by being sheltered from the sun, but also liable to get muddy and to suffer from the attacks of insect marauders.

There has been much discussion on the subject of "topping," which some experienced gardeners hold to be useless, while others heartily approve of it. Our own experience is strongly in its favor, but with this limit, that the pruning shall not consist merely in promiscuous cutting off of the top branches, since by this severe process the plant is weakened, as we know that the leaves of plants answer to the lungs, drawing nourishment from the surrounding air. Examine a Tomato-vine upon which the fruit is well set, and it will be found almost invariably that from the main stalk, just below each bunch of fruit, a branch starts out. This branch, commonly called a "sucker," should be removed, that the strength of the plant may go to the perfection of fruit rather than to growth of the vine. Also, where two bunches of fruit grow one above the other on the same stalk, cut off the top of the vine above the upper bunch. By this process we consider that the fruit ripens from ten to fourteen days earlier than by the old method.

There are many desirable varieties of Tomato, among which, after numerous trials, we may name two as being all that can be desired. The *Early Smooth Red*, although one of the oldest varieties, is yet unequalled as an abundant bearer, and ripens as early as any other. The fruit is not so large as the *Large Red*, but there is less waste in its use on account of the smooth surface from which the skin is easily removed. Its color is a rich coral-red, shape round but much flattened, and flesh very solid. For ordinary table use, simply stewed in the usual way, for soups, sauces, catsup, or canning, there is no better variety.

EARLY SMOOTH RED TOMATO.

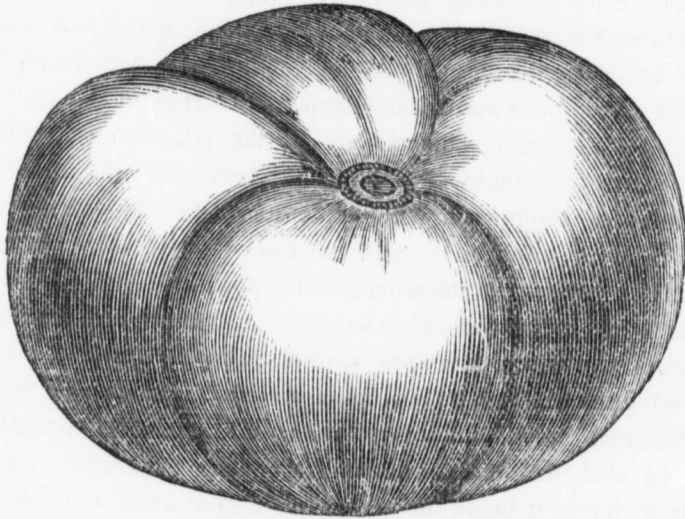
For pickling and preserving, the *Red* and *Yellow Plum* are beautiful varieties. The coloring is very clear, skin smooth, flesh delicate, size never exceeding two inches in length by one inch in diameter.

The *Fejee* is a favorable variety in the Western States, and is very similar to the *Smooth Red*, except in color, which is dull and muddy. There are various other sorts much cultivated, such as

the General Grant, Tilden, Trophy, and Cook's Favorite, all of which have good points, though scarcely so reliable as the first variety we have described.

Knowledge of the origin of these many varieties of vegetables, which are so useful and beneficial to man, we owe to those Apostles of Nature, who, through patient years of labor and research, have revealed to our blind eyes her wonderful and hidden things. From "leaning his ear in many a secret place," Mr. Darwin comes to tell us that the characters of wild plants always show a definite relationship to the conditions in which they are placed. The form and other characters of the organs have for their object to secure the existence of the plant under the local conditions of its habitat; varieties not endowed with qualities to endure this *struggle for existence* therefore perish. These wild plants have to protect themselves against dangers which threaten from other plants, or animals, or the hostility of the elements, consequently only those which happen to be best endowed in these respects will reproduce their kind and further develop their special properties. Thus plants of different organization requiring different qualities in soil, position, and light, often thrive best side by side, while those having the same requirements must make a violent struggle for existence. In our fields and gardens we grow many plants which are well suited to soil and climate, as they are to the uses of mankind, but these would soon be exterminated unless assistance were given them against those competitors for space and nourishment whose name is legion, commonly termed *weeds*. On the other hand, the relationship of the wild plant to its environment is different from that of the cultivated plant, since man protects his charges, in order to preserve them, placing them under favorable conditions, in order that those properties which are useful to him may become to the utmost developed. The object of cultivation, therefore, is while retaining its primitive value as food, to improve the flavor, sometimes to attain as large a size as possible, sometimes to increase the succulence of the tissues, and again to alter the time of year at which the vegetable can be used.

The relation of cultivated varieties is explained if we suppose that only those varieties were cultivated at first in which some peculiarly useful quality was more strongly manifested than in the others. This quality was again displayed in some of their descendants and only these individuals were again selected for reproduction; the marked end—desirable quality—being thus continually increased in strength.



EARLY SMOOTH RED TOMATO.

A word here as to the saving of Tomato and all other seeds. If one will only take the trouble to always select the first matured fruits, and the best specimens only, for seeds, and continue this method each year, there is no question that great advance may be made in procuring early varieties. But the grower grudges to give up the first products of his vines, knowing that later there will be plenty for seed when the crop is fully ripened. We believe this to be a mistake, especially with market gardeners, to whom even a few days' advance in ripening is of the utmost value, and who, in the long run, would profit by this apparent sacrifice.

ASPARAGUS—CULTURE AND PROFITS.

BY ANNIE L. JACK.

Some years ago in looking over the seed catalogues from New York, I became interested in the description given of a new Asparagus, the stalks of which were represented as three or four times thicker than the ordinary kind. It had been named Conover's Colossal, and the seed was one dollar per ounce. We sent for that quantity on trial in spite of the fact that "Henderson's Gardening for Profit" strongly affirms that the *Asparagus Officinalis* of our garden is confined to one variety, subject to modifications of soil and climate. The seed was sown in rows a foot apart, in a small bed that had been enriched with well-mixed compost and made fine with a steel toothed rake. The number of plants of this kind from an ounce of seed is estimated as 500 by books, but referring to my journal of the following year I find this item, "Planted in field 780 asparagus roots," which proves the seed to have been good and the dealer generous. The transplanting was done in April, the rows being seven feet apart, and plants three feet apart in the row, as "land being cheaper than labor" we do all possible work of keeping clean by the aid of cultivator and harrows. The bed has now increased in size till we have a small field of an acre and a half, while seed is sold of this variety at one dollar per pound, and is fast supplanting the old-fashioned variety. The cultivation of asparagus is as easy as that of potatoes or corn, the chief point being to keep down weeds and never to allow the seed to fall, in case it might sprout up in weak shoots when not wanted. We apply salt some seasons at the rate of ten bags per acre, all brine, or anything of a saline nature being useful in promoting its growth, and in fact a necessity when grown so far inland, the plant being a native of the sea-shore. The manuring is done after the cutting is over—a furrow laid open between the rows—and well-rotted stable manure applied liberally, when the plough follows and covers

it over at once. The beetle which has been destructive on Long Island has not yet troubled us, and it is a pleasure to have *one* crop free as yet from insect enemies. The cutting is done in early morning between the hours of five and seven, as we have found by experience that the stalks wilt sooner when cut in the sunny hours of the day. Each person takes a flat basket and broad-bladed knife, and the work requires a little skill for a beginner, as there is danger of cutting off the heads of the plants not yet in sight. This is best discovered by allotting to each cutter certain rows, to be regularly cut by him. A few mornings will show which are to be most trusted and careful. The stalks are laid in a straight row ready for the buncher to lift without trouble, and all that are small or deformed are cut regularly, but left in one corner of the basket, for if allowed to remain and shoot up they would soon destroy the plantation, filling up the ground, and taking away the strength from the plant. It was very amusing, during the first years of our experience in growing this vegetable, to answer all the questions presented by those unacquainted with the method of growth and culture. "What do you grow here?" "Asparagus." "Sow it every year?" "No." "How long does it stand the ground?" "Oh! forty or fifty years." (This is generally received with a doubting laugh). Sometimes in the height of the cutting we are met with an air of sympathy. "Is that 'Sparrowgrass' all killed this year?" alluding to the bare appearance of the field, which must be kept so as long as the cutting continues. But if the questioner enters the buncher's shed he there sees the process of tying, which is done by means of a home-made machine, where with bass matting the bunches are all laid straight and made uniform, each containing forty or more stalks, which are subject to a gentle pressure, cut even and packed in strawberry cases with a little moss. The demand for this vegetable is on the increase, as it is considered efficacious in some cases of rheumatism, and there is no doubt of its value as a diuretic, and in cases of diseases of gravel and kidneys its great cures are well known. The profits of the crop vary according as the season is early or late, and also if the cutting is by hired help or otherwise. As with us the work is

done without any expenditure, we find the crop exclusive of labor to be worth \$4.00 per acre. It is light and pleasant work, and all done in the morning hours except on Saturday, when it must be cut as late as possible in the evening in order to stand over till Monday without waste. Taken altogether it has proved the most satisfactory dollar we ever invested in garden seeds.

ANIMALS TO EUROPE.

OF ANTIOCH

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... been going on at the same time, and now this country is peopled with a European fauna hardly less numerous than the European flora, to which last year I called attention.

Not that the larger wild animals of Europe have come over and taken possession of American soil. This would be as difficult, I had almost said as impossible, as that European trees should do the same. The obstacles previously mentioned, which stand in the way of the introduction of forest trees of Europe, equally

it over at once. The beetle which has been destructive on Long Island has not yet troubled us, and it is a pleasure to have *one* crop free as yet from insect enemies. The cutting is done in early morning between the hours of five and seven, as we have found by experience that the stalks wilt sooner when cut in the sunny hours of the day. Each person takes a flat basket and broad-bladed knife, and the work requires a little skill for a beginner, as there is danger of sight. This is done in rows, to be ready for which are to be cut in straight rows that are small. The top of the basket, soon destroyed by the strength of the years of our experience, questions present growth and culture. "Sow it every year on ground?" "With a doubt, but we are met with this year which must be the questioner of tying, which with bass mat-

NOTE.—Professor Claypole's absence in England has prevented his seeing the proof of this paper. The reader is therefore requested to pardon any accidental errors which he may observe. The following are a few inaccuracies which have unavoidably crept in :—

Page 73, line 13, for (*Apis Mellifica*) read (*Apis Mellifica*).

" 74, line 3, for (*Trochilium tipuliforme*) read (*Egeria tipuliformis*).

" 77, line 3, for (*Arctia caia*) read (*Arctia caja*).

" 77, lines 29 and 30, for (*tinea flavifrontella*) read (*Tinea flavifrontella*).

" 78, line 18, for (*Pieris rapæ*) read (*Pieris rapæ*).

" 80, line 32, for (*Eriosoma lanigerum*) read (*Eriosoma lanigera*).

" 82, line 28, for (*Abraxas rubcaria*) read (*Abraxis rubcaria*).

" 83, lines 28 and 29, for Mr. Sanders read Mr. Saunders.

" 85, line 31, for Mr. Samuel Gott, read Mr. B. Gott.

" 87, line 6, for Joseph Williams, Esq., read Jas H. Bowman, Esq.

form, each containing forty or more stalks, which are subject to a gentle pressure, cut even and packed in strawberry cases with a little moss. The demand for this vegetable is on the increase, as it is considered efficacious in some cases of rheumatism, and there is no doubt of its value as a diuretic, and in cases of diseases of gravel and kidneys its great cures are well known. The profits of the crop vary according as the season is early or late, and also if the cutting is by hired help or otherwise. As with us the work is

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ON THE MIGRATION OF EUROPEAN ANIMALS TO AMERICA AND OF AMERICAN ANIMALS TO EUROPE.

BY PROF. E. W. CLAYPOLE, B.A., B.S.C., (LONDON), OF ANTIOCH COLLEGE, OHIO.

The present paper is a sequel to one that appeared in this Society's Report for last year. I then set forth some facts, more or less well-known already, regarding the wholesale migration of European plants to America, and their naturalization here, and the striking failure of American plants to migrate to Europe and to establish themselves there; at the same time suggesting one among several forcible causes which in part explain a fact at first sight so strange.

Having been requested again to contribute to these pages, it seemed to me that a somewhat similar sketch of what has been taking place in another field might not be without use or interest. The occupation of American soil by European weeds and European men is not the only occupation that has taken place. Another invasion of this Western World, to most persons even less conspicuous, has been going on at the same time, and now this country is peopled with a European fauna hardly less numerous than the European flora, to which last year I called attention.

Not that the larger wild animals of Europe have come over and taken possession of American soil. This would be as difficult, I had almost said as impossible, as that European trees should do the same. The obstacles previously mentioned, which stand in the way of the introduction of forest trees of Europe, equally

oppose the introduction of the larger wild animals. But as European weeds have freely crossed and settled here, so have the smaller members of the European fauna—the animal weeds—if I may coin the expression, squatted on Canadian and American soil and obtained citizenship here. In other words, the so-called New World is almost as much a home for European insects and vermin as for European weeds.

Especially is this true of the more injurious and annoying portion of the group. The list is a long one of insects, which, though not native to the continent, have crossed in the trail of man, and stand prepared to steal from the farmer his hard-earned crops as they stole them when both were yet at home in the old country.

It is more than probable that many readers will be surprised to learn that some of the creatures to which reference will be made, are not natives of the Western World. They are so common, so familiar, so widespread, and many of them so destructive, that most persons never doubt their home or ancestry, and consider them as truly indigenous as the opossum, raccoon and rabbit.

The European fauna gives us more decided proof that its larger members could run wild here if they had the chance than did the European flora. The pig (*Sus scrofa*) was one of the first domestic animals introduced. Wherever the white man settles, this companion of civilization settles with him. But the pig soon escaped from his control, took to the woods and bred there in great numbers, so that about the beginning of this century they might be found wild in many of the midland States. Their later complete disappearance is due to man. The horse (*Equus caballus*) and the ox (*Bos taurus*) were introduced by the Spaniards in the early days of their intercourse with the New World. Escaping, as the hog, these animals too have run wild and multiplied until the plains of Mexico and South America seem naturally the home of the mustang and wild cattle. But though the horse is not a native of this continent, it is both curious and interesting to note that North America can lay claim to his ancestors. The tertiary beds of the Western States have yielded to the labors of Prof. Marsh

the story of his family ever since the time when he was represented by a fox-like animal, whose five toes all reached the ground and were serviceable for walking, whereas by gradual retrenchment of these organs the horse now stands upon the tips only of middle fingers and toes, the other digits being reduced to mere rudimentary appendages or having altogether disappeared.

Besides these the European black rat (*mus rattus*), the genuine old Tory rat of England, came over in the "Mayflower," or earlier still, with Jacques Cartier, and creeping ashore along the mooring hawser, crawled out stealthily to see to what kind of country he had come. Finding it a goodly land, with plenty of corn and nuts and few rats, he squatted on it at once with his fellows, and obeyed the command to increase and multiply. In a short time the cellars, granaries and warehouses of Canada and New England teemed with this irrepressible European pest, and the same deadly feud sprang up between him and man as had existed in the Old World from time immemorial. He occupied the whole country as fast as the white man, or perhaps a little faster, going apparently somewhat in advance of him, until North America seemed a perfect rat-paradise, with plenty of food, plenty of room, and few enemies except man.

But the Tory rat had his day—he had his day and ceased to be. The Whig rat—said to have come over to England in the same ship that brought over William of Orange—gradually spread over the whole of the British Isles, fighting down, eating out, or mingling with the old black rat. So complete has been the change that now the so-called Norway or Hanover rat, the brown rat (*mus decumanus*), is master of the situation, and the black rat, like the Celt before the Saxon, retired to certain fastnesses, such as the Whitechapel docks, where from some natural advantage or other cause, he still holds his own, like the Celt in Wales and Cornwall.

In process of time it came to pass that the Whig or Norway rat also crossed the Atlantic, and took up his abode on these Western shores. Here he found the country occupied just as it had been in England by the rat of opposite political opinions, and the struggle between Whig and Tory, so well known in the pol-

itical history of the United States, was enacted on another scale, and a lower zoological level, but with similar results. An observing friend of mine, who had moved from Connecticut to Ohio forty years ago, assures me that he has twice outwested the brown rat. On his arrival in this (S.W.) part of the State, the brown rat was unknown, and the ground was entirely possessed by the black rat. Soon after his coming here the former appeared, and the latter in a short time completely disappeared. After a residence of some years this gentleman removed to Illinois, and in so doing again passed beyond the range of the brown rat. But in a few years it followed him, and the same dispossession again occurred. The brown rat invaded the State, and drove the previous occupant still further west. In this way state after state has been overrun, so that it is impossible to doubt that ere long the whole sub-domain of Canada and the States will be as thoroughly held by these vermin as are the subterranean portions of human dwellings in the Old World.

Not as a friend of the rat, certainly, for the two seldom live together, but as an accompanying nuisance, the common mouse (*musculus*) also came over from Europe, and is now as mischievous and annoying here as there. Judging from past experience, these two bid fair to become as cosmopolitan in their distribution as the white man whom they so constantly accompany, and on whose labors they feed and thrive.

Of later importation, and rather designedly than accidentally introduced, is the English sparrow (*passer domesticus*). This inhabitant of Europe owes his presence to his well-known insectivorous habits. Buffon estimated that a pair of sparrows during the breeding season destroy 4,000 caterpillars a week. In this way they greatly assist in keeping down the insect pests of Europe, and have conferred similar advantages on many parts of this country where they have been introduced. "It supports equally well severe cold and extreme heat." Not being migratory, its insect-hunting practices continue all the year round, and the full benefit, therefore, is secured. The sparrow is a bold, somewhat intrusive bird, used to city life, city manners and city smoke, and

quite capable of holding his own against most other birds of his own size. But in some places where it has been introduced and has done immense good by keeping down or exterminating some of the most destructive of our insect foes, such for instance as the canker-worm, these benefits have been forgotten, and the benefactor denounced as a nuisance, not, by the way, an uncommon occurrence amongst men. He is charged with driving away other birds, with making a constant noise which cannot be called musical, and with other heinous crimes deserving capital punishment. Many of these charges are unjust, and could his accusers have their way, the sparrow would soon be avenged by the mischief which his insect food, if uneaten, would do. Says Mr. Galvin, forester to the City of Boston:—

“The introduction of the sparrow was immediately attended with benefit almost beyond calculation. The trees on the Common were infested with a nasty yellow caterpillar which destroyed the leaves and buds of the elms and others. These insects increased very rapidly, in spite of all that my men could do to destroy them, and at the south end the elm trees were eaten every June by swarms of canker-worms. Both these pests have been pretty nearly exterminated. But for the sparrow, however, they would return. I believe that the wages of all my men would not compensate Boston for the loss of the sparrow.

“I say, without hesitation, the sparrow does not molest or interfere with any other bird. All summer he is with the robin and bluebird, and I have never witnessed any animosity myself, nor have any of my men. The robins were more numerous on the Common last year than ever before. The chip-sparrows have also become very numerous, and may be seen feeding with the sparrows on the same bit of bread. Before the sparrows came there were no bluebirds. Now they are quite common, and often treat the sparrows very badly and break up their nests. The sparrows of course show fight, but the bluebirds are always too strong for them.”

I have given this long extract, somewhat condensed, in the hope that it may lead some to remember that the destruction of a benefactor, when a part of his benefit has been enjoyed, is the sure

way to bring back the evil he has in part removed. It is killing the goose that laid the golden eggs.

At the same time it is quite possible and would accord with the analogy pointed out in this paper that, in other situations and outside of the cities, this bird may sometimes so increase as to become mischievous. Many of the complaints, however, concerning them must be received with great caution, for even when they are charged with destroying buds, these buds may contain insects, and the little fruit they eat is only a tithe of what they save. Other devices than their destruction may be resorted to, as in England, to protect fruit, &c., from their attacks. The Rev. J. G. Wood says, in his "Natural History":—"In every case where the sparrow has been extirpated there has been a proportionate decrease of the crops from the ravages of insects, as in Maine and Auxerre (France). Let us pause before yielding to the hue and cry now raised in some quarters against the English sparrow." Though at rather undue length on this point, I may add the following: A friend of mine in this neighborhood, desirous of seeing more birds about his farm, and finding that the canker-worm was attacking his white elm and apple trees, bought a dozen young English sparrows at Cleveland, about the year 1872, for \$18, a price which would create some stir among English boys. Nine of them died, leaving three, a cock and two hens. Next year these Mormons built two nests and reared the young. By the end of the following season the family numbered thirty. Not a canker-worm has since been seen on the premises. The sparrows were seen devouring them wholesale. They live with the other birds, building in the same cot with the martens, who will sometimes drive them off and break up their nests. The bluebird and chip sparrow are very friendly with them, and no damage has been done in the garden. One American robin or blue jay will do far more mischief among fruit than fifty English sparrows.

But it is time to pass on to the more immediate subject of this paper—the insect immigrants from Europe.* Let me mention

* The statement has been made that the American Quahog, or Round Clam, (*Venus Mercenaria*) has been found living in English waters, introduced accidentally with American oysters.

first a few the date of whose arrival is unknown, but which probably accompanied some of the earliest settlers.

Among the minor plagues of life, especially to the housekeeper in this country and in Europe, but almost infinitely worse here than there, is the ubiquitous House-Fly (*Musca Domestica*), only inferior to the mosquito as a torment, and far his superior in abundance around the habitations of man. To whom the western world is indebted for this addition to its Fauna, we shall never know. Probably he stole a passage on the "Mayflower" to New England, accompanied John Smith to Jamestown, and Jacques Cartier to the banks of the St. Lawrence. He has been here so long, and increased so rapidly, that scarcely a house on the continent is free from his unwelcome presence. In spite of constant war waged against these summer pests, their rate of multiplication is so rapid that they swarm in millions in every town and hamlet, and every effort to destroy them, or even to reduce their number, seems hopeless.

Here we may allude to the Flesh Fly (*Musca Vomitoria*), and the Blue-bottle Fly (*Musca Cæsar*), both old enemies of the clean, but firm friends of those who live in dirt, and among the offal of their food. Both of these, like the House Fly, have acquired by possession such inalienable rights that a stranger would be likely to suppose America to be their native land, and Europe the country of their adoption.

The Angoumois Moth (*Butalis Cerealella*) is one of the most destructive foes of the grain after it is stored in the granaries of France. It eats out the floury part, leaving a mere shell. It became common about the beginning of the last century in North Carolina, whence it spread into Virginia, Kentucky, and Ohio, and is occasionally found in New England. It is sometimes very abundant, and very destructive. This insect "abounded in exhibits from various countries" at the Centennial Exhibition of 1876.

It is quite possible that not a few noxious species will be found to date their introduction to the Centennial year, though the Commissioner appointed to report on this subject says:—

"Most of the species obtained in the building have been

already distributed over the globe by the ordinary channels of trade, and nothing is to be apprehended from the addition of a few hundred thousand specimens to the incalculable millions of the same kind now domiciled among us." The species found, which have not been previously observed in the United States, will be innocuous. "I may therefore announce with moderate certainty that no evil result will occur to our agricultural interests, from any introduction of foreign insects by means of the exhibits."

The Grain Weevil (*Calandra granaria*) is even more destructive to grain than the foregoing. It is not uncommon in granaries where this beetle is numerous to find nothing left of a heap of wheat except the husk. Moreover, all kinds of corn seem to be acceptable to this destroyer, which has also crossed the Atlantic and commenced its ravages in the granaries of America. After the wheat has passed through the mill it becomes the prey of the meal-worm, (*Tenebrio molitor*) often a great nuisance to the housewives of Europe, and now thoroughly naturalized here. It feeds chiefly on damaged flour.

Turning to the orchard, the tiny apple-tree bark-louse barely visible to the naked eye, in many places, and in some years does more harm to the apple-tree than any of its other insect foes. It swarms in the orchard and the millions of little beaks are engaged in sucking from the trees their very life-blood. The effect soon appears in the sere and falling leaf, and later in the death of the tree. For this, too, we are indebted to Europe, where, however, its ravages are insignificant compared with those which it commits in this country. The Northern States and Canada West are the districts in which it most prevails, and where the greatest mischief is done.

Every lover of apples is too familiar with the larva of the apple worm or Codling Moth (*carpocapsa pomonella*) and with the mischief it does to the apple crop of Canada and the States. Burrowing into the apple at the eye it nestles around the core and pips until its growth is complete, when it eats a way through the side of the fruit and makes its escape. The housekeeper here hardly dares to put whole apples into her dumplings, as is the practice in England,

lest inside it should be the white, fat larva of the Codling Moth, with its accumulated grass. Its winding tube bored hither and thither causes further waste in cutting it out, and the value of the apple crop is often diminished by a half by the wreck it works inside the fruit. Yet the Codling Moth is no native of America, but was introduced from Europe with the apple on which it feeds, and rapidly spread over the Eastern and Midland Provinces and States. It seems quite impossible to import the fruits and flowers of Europe without sooner or later importing the insects that prey upon them and destroy them. And once here, many of them, as the Codling Moth, become nuisances and pests, and inflict damage immeasurably beyond anything known in the Old World.

The Honey Bee (*Apis Mellefica*) was introduced into North America at Boston by the English, in the seventeenth century, and is said to have been driven over the Alleghany Mountains by a hurricane in 1670. There is no honey-making bee indigenous to North America, though some of the species found here collect a small quantity. They were long known to the Indian as "English Flies," and Irving says they considered them the harbingers of the white man. To this Longfellow alludes, when in *Hiawatha* his Indian warrior sings :—

"Wheresoe'er they tread before them
Swarms the stinging fly, the Ahmo,
Swarms the Bee, the Honey-maker."

Soon escaping from its human masters, it took to the woods, where it multiplied rapidly until now the Honey-bee of Europe is familiar from the Atlantic to the Pacific, and is often thought of as a native insect. It is, however, probably of Asiatic rather than of European origin.

For many years the Honey-bee flourished in America undisturbed by one at least of its worst European foes. Not until the beginning of the present century was the Wax Moth (*Galleria cereana*) introduced, but the American and Canadian bee-keepers now suffer as much from its ravages as their brethren in Europe. It consumes their wax, wastes their honey, and clogs the combs with its web.

The European Red Currant is persecuted on this continent by its imported European enemies to a degree quite unknown in its old home. The Currant Borer (*Trochilium tipuliforme*) has followed it, injuring and at length destroying the bushes by boring in the stem. In or about the year 1856, the European Currant Saw-fly (*Nematus ventricosus*) made its appearance, introduced no doubt in earth about the roots of currant or gooseberry bushes. Messrs. Riley and Walsh, in the American Entomologist, traced it to the celebrated nurseries of Messrs. Ellwanger and Barry, at Rochester, and suspect that it had been previously imported into Maine and Vermont. "In nine years it reached the Hudson River. In 1860 or 1861 it was found at Erie, Pa., in 1864, at Ann Arbor, Mich., having spread at the rate of about 25 miles a year. It has been known in this part of Ohio for four or five years, and bids fair to run through the whole country, and make the raising of this favorite fruit both difficult and uncertain.

Among the insect-plagues of the farmer there are two so eminently destructive that they are objects of national importance and deserve more than a passing mention. In the first year of the infant Republic, and almost before the ink on the Declaration of Independence was dry, an enemy set foot on this continent destined to commit greater ravages than any yet named. In August, 1776, Earl Howe, with a force of Hessian troops, landed on Long Island, and while these soldiers were the foe to which attention was directed the real danger lay in the straw they brought with them as litter for their horses. There were in all probability concealed a few chrysalids of the Hessian Fly (*Cecidomyia destructor*) future destroyer of the American wheat crop. Within two or three years of that time, so rapid was its increase that we read in the Colonial History of New York, as quoted by Dr. Fitch:—

"1779. No wheat can be bought for continental money, nor for hard money under twelve shillings (\$2) a bushel. The last harvest was short on account of a blast and a *fly* which before the snow fell devoured the green blades."

Since that time the Hessian fly has spread through almost the whole country where the winter wheat is grown, and its ravages

have been at times so great as to prevent the cultivation of the plant. "It reached Saratoga, at a distance of 200 miles, in 1789." "It was reported west of the Alleghany mountains in 1797." Says Dr. Harris: "Wheat, rye, barley, and even timothy grass were attacked, and so great were its ravages that the cultivation of wheat was abandoned in many places." It is not too much to say that in this locality (S. W. Ohio) I have during the past two years seen many fields in which one-fourth, at least, and in some a much larger part, of the crop was destroyed by this insect.

Transcending, however, even the Hessian fly in its destructive work in our wheat fields, is another European immigrant—the Wheat Midge (*Cecidomyia tritici*) or as it is commonly called by farmers in this part of the country, the weevil—a name which should not be employed as it belongs to a family of beetles. To Canada is the rest of the continent indebted for the importation and distribution of this destroyer. According to Dr. Fitch, it was recognized as early as 1828, on the St. Lawrence, above Quebec, and it is said to have been found in N. W. Vermont even earlier. Quebec appears to have been its port of landing, and its progress over the country appears to have followed the St. Lawrence and Sorel rivers. Thence it steadily advanced upon the wheat crop in all directions. About 1849, it began to destroy the crops on the north shore of Lake Ontario. The Secretary of the State Agricultural Society of New York estimated the value of the wheat destroyed in that state, in 1854, at fifteen million dollars. Much was never reaped at all. Canada, Upper and Lower, and Nova Scotia, sent in similar reports, the loss in the former province being estimated at two and a half million dollars in 1856. But space forbids detail. Writing in 1865, Dr. Fitch says:—

"In consequence of the presence of this insect over all the New England States, and all New York and Canada, except their western parts, wheat has wholly ceased to be a staple product. Wool growing and dairying have become the leading pursuits. These require fewer laborers. Then this insect has done much toward reducing our population by producing extensive emigration to the west." "Upon one of the Vermont hills, within sight of my

residence, from which in former years seven stalwart men regularly made their appearance at militia musters, the hearth fires are now extinguished and the dwellings demolished."

This is surely one of the most striking illustrations of the truth that small causes can produce great effects if sufficiently multiplied. The midge has driven the cultivation of wheat out of many districts altogether, and in many others it can only be continued because the heat of the climate brings the plant to maturity before the insect can seriously injure it.

The list is yet far from being exhausted. We have a cockroach in America, a harmless insect enough. But he has a relative, the Asiatic and European cockroach (*Blatta orientalis*), of habits so different that there are many houses in England of which we may, without exaggeration, say that the cockroaches tolerate the presence of the human owners. This pest landed from some infected ship, and at once preëmpted a claim in the western world, that extends from the Atlantic to the Pacific. This claim his descendants are rapidly occupying without the slightest danger of dispossession.

There are cheese-lovers in the old country who eat and say they prefer "skippery cheese" to any other. I have seen at least one such who was accustomed to munch, with apparent relish, a piece of such cheese alive with what the uninitiated declared were "maggots," but which he asserted were only cheese in a concentrated form—cheese alive. To the cheese-maker in England this "hopper" (*Piophilæ casei*), is a nuisance, against which he is compelled to wage unceasing war. But this "nuisance" has long been at home in America, and the epicure may gratify his taste for "skippery cheese" on this continent without importing it from Europe.

About half a century ago—quoting again from Dr. Fitch—the European Onion-fly (*Anthomyia ceparum*), made its appearance on this continent, and since then has spread over all the Eastern States, though I have not yet heard of it in the West. There is a native American Onion-fly, but the mischief it does is so insignificant beside that caused by its European relation, that few gardeners even notice its presence.

All our European immigrants, however, are not injurious. Let us relieve the monotony of this list by noticing one or two. The Garden Tiger moth (*Arctia caia*), is known, but has never become abundant here. Several specimens were taken at Trenton Falls in 1837, by the English entomologist, Mr. Doubleday. This "woolly bear" of English children appears to be the insect mentioned in Hiawatha:—

"The mighty caterpillar
Way-muck-kwana, with the bear-skin,
King of all the caterpillars."

An English entomologist would be almost wild were he to catch sight of a specimen of the Camberwell beauty (*Vanessa antiopa*), and should he succeed in capturing it, his joy would be unbounded. It would be one of the events of the season. Since its old haunts at Camberwell were built over by the growth of the "Great Metropolis," it has become so exceedingly rare that Stainton, writing in 1857, could say: "It has hardly been seen for ten years." Yet here when it was introduced at an early date it has become so thoroughly naturalized that now it is one of our common species, and in some seasons has so abounded as to become destructive and awaken the foolish fear of the country folks, leading them in not a few instances in New England to fell the tall Lombardy poplars on which the harmless larvæ were feeding, under the impression that they were poisonous, and must be destroyed at any cost.

But I must bring this list to an end. Let me notice a family, small in size but great in number and in destructiveness, and all foreigners,—a family whose members vex lady readers more than most of the above,—the great *moth* family, using the word in its proper sense. Foremost comes the clothes moth (*tinea flarifrontella*) feeding on woollen fabrics; the carpet moth (*tinea tapetzella*) whose home is between the carpet and the floor; the fur moth (*tinea pellionella*) so destructive to winter clothing, and the grain moth (*tinea granella*). This last is too common in granaries, where the caterpillar forms its nest on the outside of the heap, binding several grains together, or spinning its threads over the whole, and covering it with cobwebs.

Space forbids more than a mention of many of the parasites which have crossed in the train of man to prey upon him and the domestic animals. The great army of fleas, bed-bugs, lice, sheep, cattle and hog ticks, sheep, horse or ox bot-flies, with the infamous muscle-worm of the pig (*trichina spiralis*) are all foreigners naturalized here, and combine with the native blood-suckers, pre-eminently the mosquito and black fly, to render some places almost uninhabitable to those whose hide is thinner than that of the rhinoceros.

And the end is not yet. Not yet has Europe ceased to send over to America her surplus population—human and insect, worthy and worthless. For more than two hundred years the cabbage enjoyed almost perfect exemption in this country from the attack of insects. The American cabbage butterfly (*pieris oleracea*) it is true fed upon it, but the damage done was trifling, and usually confined to the outer leaves. Into this cabbage paradise, however, the Evil One at length gained entrance in the form of the English cabbage butterfly (*Pieris rapæ*). Crossing the Atlantic unperceived, he landed at Quebec about 1857. In a year or two entomologists began to collect these insects—pleasant links of association with the old country—and gardeners began to collect the larvæ—unpleasant memorials of the same—and both united in foreboding trouble to the growers of cabbage. Few, however, realized the extent to which their forebodings would be fulfilled. Prof. Packard, writing in 1869, could say: "It is now found in the vicinity of Quebec and the northern parts of New England."* West and South spread the new immigrant, multiplying rapidly and travelling fast, until the growth of the cabbage became utterly impossible in many localities. It is said to have destroyed \$500,000 worth in the State of New York in one year. It works incomparably more mischief here than in Europe, eating into the very heart of the cabbage, and so ruining far more than it destroys. It appeared in this part of Ohio about 1872 or 1873, and is reported in the Canadian Entomologist for 1877 to have then reach-

* This range was too narrow for that year.

ed Chicago.* It is now far west of Chicago and St. Louis,† so that probably in a few years the whole country east of the Rocky Mountains will be only too well acquainted with this insect and its depredations. Fortunately, one at least of its foes has followed it across the Atlantic, and is gaining to a great extent the upper hand. This fly (*Pteromalus puparum*), which lays its eggs in the caterpillar, annually destroys the greater part of the broods. Two years ago out of twenty chrysalids I failed to obtain a single butterfly; swarms of these parasites issuing from the cases instead. An anonymous writer from Ontario has aptly described this mischievous little insect from the gardener's point of view in a recent number of *Vick's Magazine* :—

Frisking, flirting, airy sprite,
Little Satan robed in white,
Favorite of Beëlzebub,
Breeder of his choicest grub,
With befitting courtesy
I take off my hat to thee.

Blighter of the gardener's hopes,
Fell destroyer of his crops,
Thy existence shall be brief,
Though I smash a cabbage-leaf;
Having put thee out of pain,
I will don my hat again.

And this immigration is still going on. Asparagus has been a favorite vegetable for thousands of years. By Roman writers it is extolled as highly as by those of to-day. Its introduction into America is not on record, but no one can doubt that the English colonists lost no time in importing the culinary vegetables of their old home. Asparagus has become as great a favorite here as there. In its introduction its greatest foe and closest companion was, unwittingly of course, left in Europe. No American insect attacked it, and for more than two centuries it was cultivated in peace and with profit. But about the year 1858, according to Dr. Fitch, the asparagus beetle (*Crioceris asparagi*) made its appearance in Long Island—imported no doubt with asparagus from England—and spread rapidly over the district from Astoria as a centre, occasioning such ravages that many asparagus beds were ploughed up as useless.

* The account given in the place cited of its introduction differs from that usually accepted by placing it apparently at least three years too late. See Packard's *Guide to Insects* and *Report of the Entomological Society of Ontario* for 1875, p. 31.

† I learn this year that it is still unknown at Kankakee, Ill.

As if the foregoing list were not long enough and gloomy enough, we have quite recently added another, an enemy to the housekeeper, who may expect additional labor and anxiety in consequence of its advent. About the year 1874, says Dr. Lintner—to whose kindness I am indebted for some of these details—the European carpet beetle (*Anthrenus scrophulariæ*) was first noticed in several parts of the State of New York. Dr. Hagen reports it as early as 1872, at Buffalo, and 1873 at Cambridge and Boston. Three-fourths of these latter cases were traced, he adds, to a large carpet store in Washington Street, Boston. “Should this insect,” says Dr. Lintner, “become as common as another of the same genus (*A. varius*), it is difficult to conceive how the luxury of carpets can still be indulged in within our homes.” The danger is great. “Its power of increase is almost incalculable. Camphor, pepper, tobacco, turpentine, carbolic acid,” says Dr. Lintner, “are powerless against it.” It eats large holes in the carpets, and living in the crevices of the floor, cuts them through as with a pair of scissors along the joints of the boards.

Thus has Europe contributed to people America. What will be her next gift? And it must be borne in mind that these European incomers multiply far faster, and do as a rule infinitely more mischief here than there. So there is this, that some of them were not recognized in Europe until the reports of their wide-spreading havoc in America excited alarm. The British Privy Council met specially to take measures for preventing the introduction of the Hessian fly into England, not knowing that it had been there from time immemorial, and had gone thence to the West.* In one or two instances, at least, it is still somewhat uncertain whether the insect migrated from Europe to America, or from America to Europe. The woolly apple tree bark louse (*Eriosoma lanigerum*) is an example of this. To the causes of this

* An interesting paper might be written on the migration of some of these insects to Europe from Asia, for not a few of them can be traced to the Eastern continent, and it must not be inferred that the original home, whatever that expression may mean, of all these insects, is Europe because they are here spoken of as European

remarkable difference of behavior I shall return presently. It is enough here to notice the fact.

Here this list must end, because time and space fail. Add to the depredation of these foreign pests the numerous native insects which plunder the farmer and the gardener to an extent unknown in England, and we shall not be surprised to learn that, according to an estimate made not many years ago by a competent entomologist, the annual loss to the country exceeds \$300,000,000. The prospect is not comforting.

The other side of the question now calls for consideration. To what extent has America contributed of her insect population to increase the destroyer of the European farmers' crops? Here, as was the case with American weeds, we are struck with the scantiness of the list.

Foremost among fruit-destroyers of native origin is the detested Plum-weevil (*Conotrachelus nenuphar*). More fruit is destroyed by this insect than by all others together in many parts of the country. Few are the kinds that are spared by this little Turk. The eggs are laid in the plum and nectarine, and the fruit withers and falls; in the cherry, and the fruit swells and ripens, but the housewife must stone or examine almost every single one in order to determine whether she is canning fruit or a hotch-potch of weevil-grubs, grass, and fruit together; in the apple, and the fruit shrinks, becomes one-sided, and falls off hard, knotty, bitter and woody material, instead of flesh. In many parts of the country the culture of the plum has been abandoned, and the trees have been cut down. The downy skin of the peach saves it from becoming the nest of this weevil, but when the fruit is ripe the snout of the beetle bores through the rind and then lets in fungus spores, which soon cause fermentation and decay. No easy or thoroughly successful mode of checking it has been discovered, and it continues to work havoc among the orchards and gardens of the United States, and to some extent in those of Canada also.

Yet this insect has never crossed to Europe. There the plum and cherry, the peach and nectarine grow undisturbed, and grubby fruit is almost unknown.

The Canker-worm (*Anisopteryx vernata*), so widely distributed and so destructive to the apple-tree, if it has ever crossed the Atlantic has not established itself on the other side. The Squash bug (*Coreus tristis*), so mischievous in gardens, and the yet more noxious Chinch-bug (*Rhiparochromus leucopterus*), of which Dr. Shimer says that in 1864 it destroyed three-fourths of the wheat and half of the maize through almost the entire North-West, are equally unknown there. The apple-tree flourishes there free from its deadly enemy, the apple-tree borer (*Saperda candida*). The peach tree is not killed by the peach-tree borer (*Aegeria exitiosa*). The apple-tree web-worm (*Clisiocampa Americana*) and the forest web-worm (*C. Sylvatica*) never spin on the orchard and forest trees their silky webs. The northern Army-worm (*Leucania unipunctata*), which sometimes covers wheat-fields in the United States, is there unknown. The American Cut-worms (*Agrotis*) have never been seen there, though represented by European forms. The black locust tree of America grows and flourishes in Europe free from its native foe, the locust borer (*Clytus robiniae*), which renders its growth impossible in some parts of the States.

The leaves of the rose, the pear, the vine and the raspberry, are not there destroyed by the attacks of the slugs, or larvæ of four Sawflies (*Selandria rosæ*) (*S. cerasi*), (*S. vitis*), and (*S. rubi*). The Tussock moth (*orgyia leucostigma*) does not destroy the foliage of the shade-trees, as in Philadelphia and other cities. The ash-grey Blister-beetle (*Lytta cinerea*), which renders the cultivation of English Windsor beans impossible in many parts of the States, has found no lodgment there. The currant Spanworm (*Abraxas rubcaria*), sometimes so destructive in Canada and the States to the red currant, is not known in England. None of the American bees and wasps have emigrated thither. The same is true of the butterflies and moths of this continent, even the abundant black-bordered Sulphur (*colias philodice*), which feeds chiefly upon the European clover in America, has never, so far as I am aware, been seen in England.

A few exceptions must, however, be noted to the general exemption. "The only specimen of white ant which exists

within the limits of the United States (*Termes frontalis*), has been known for a long time as a guest in the plant-houses of Schönbunn, in Germany, but is not recorded to have spread into the surrounding country." "A very minute yellow ant (*Myrmica molesta*), which often infests houses through the United States, has, according to Frederick Smith, become generally distributed and naturalized in houses in England." The American cockroach (*Blatta americana*), says Dr. Hagen, is common in sugar-refineries at Archangel. The Pea-weevil (*Bruchus pisi*), of which Mr. Bethune remarked in the Canadian Entomologist for January, 1876, "we fear it may soon become a source of great loss to our agriculturists," is another immigrant to Europe, where it is now common in the South, though the damage it causes is much less than that which it commits in some parts of America. Prof. Kalm says the inhabitants of some parts of Pennsylvania, New Jersey, and New York, have been compelled to abandon the cultivation of this delicious vegetable, in consequence of the prevalence of this insect. And Prof. Riley says: "The knowledge of the fact may not add to our enjoyment of a mess of green peas. yet the fact nevertheless remains, that those of us in the Mississippi Valley who indulge in this delicious esculent devour a young weevil with nearly every pea we eat."

It has been doubted whether this pest of the garden is really a native of America. It was first noticed near Philadelphia, whence it has spread over the States, and threatens Canada. The garden pea being an imported vegetable, the insect must, if native, have originally fed on some other plant, not a solitary instance of change of food. Though it prefers a warm climate, yet Mr. Sanders, of London, Ont., says it prevails in all parts of Canada, from the Red River to Quebec, and in some places so abundantly as to discourage farmers from growing peas at all. Prof. Riley adds: "We in the Western States are in the habit of sending to Canada for seed peas, because we then get them free from weevils, but the reason is their greater care in destroying the weevils and in sorting their seed." Though thus mischievous here, yet Kirby and Spence say it does not occur to any injurious extent in England.

England has given to America her Meal-worm (*Tenebrio molitor*), but she has received another in return in American flour (*T. obscurus*), which is now found in some places in tolerable abundance. It feeds on dry and sound flour, whereas the European Meal-worm is only found in that which is damp or otherwise damaged.

Would that we could stop here, but there is one notorious, terrible exception, which claims notice. It first attracted attention about the year 1866, though it had been mentioned by Dr. Fitch ten years earlier. The leaves of certain varieties of vine, especially the Clinton, were covered with galls from the size of a pea downward. But the mischief was so slight that the late Mr. Walsh could write of it in 1860: "I do not think there is much likelihood of it ever becoming so numerous on any vine as unduly to check its growth." So far, however, is this expectation from agreeing with the fact that this little insignificant gall-louse is threatening seriously to injure, if not to ruin, several varieties of vine in this country. This insect, like some others, the Potato-beetle, for example, has shown its good taste by transferring its attention from its native food to the now highly cultivated plants from Europe, and has taken hold of the European vine (*Vitis Vinifera*). At some time, and by some means at present unknown, it was conveyed to France, where the havoc it has made among the vineyards is such that the French Government has offered a reward of 20,000 fr. for an efficient and practical remedy. The names of Mr. C. V. Riley, late of St. Louis, Mo., and now one of the Entomological Commissioners at Washington; MM. Signoret, Lichtenstein and Planchon, are indissolubly connected with the investigation of this minute grape-vine gall-louse (*Phylloxera Vastatrix*). The second of these gentlemen, while prosecuting his investigations, was shut up in Paris by the German besieging army, but nothing daunted, he carried on his studies of this little louse, and wrote by balloon that though he himself was reduced to cats, dogs and horseflesh, the Phylloxera, which he had in boxes, kept well and in good health; a good illustration of the pursuit of knowledge under difficulties.

The Gall-louse is of two forms—one living in the summer on the leaves (*Gallicola*), and the other in the winter on the roots (*Radicicola*). In Europe the latter appears to be the more common, and is certainly by far the more mischievous. Our limit only allows a few facts. Since 1865 it has spread from Avignon, northward, eastward and westward, until it now prevails over the whole district between Montpellier, Lyons and Toulon. Out of 75,000 acres of vineyard in the department of Avignon, 60,000 have been destroyed. In the department of Gard, half an average crop was produced in 1871. In the commune of Graveson, the mean crop of 1865, 1866, and 1867, was 220,000 gallons; in 1868, 121,000 gallons, in 1869, 48,000 gallons; then diminishing year by year, until in 1873, the yield was only 1,100 gallons. Instances like this might be given to almost any extent, both from Europe and this country. It is already wide-spread here. Mr. Riley says: "I have traced it back in this country to 1834. I have with my own eyes witnessed it in Kansas, Iowa, Missouri, Illinois, Michigan, New York, New Jersey, Maryland, and in Ontario, and have evidences of its occurrence in North Carolina, Tennessee and Florida." To these I can add Ohio. At present its attacks are chiefly made upon the varieties of the Frost Grape (*Vitis endipolia* or *riparia*), and the European vine (*V. Vinifera*), and their hybrid, such as the Clinton, Cornucopia, Taylor, Marion and Delaware. How long this will remain true, it is impossible to say.

This pest is evidently at present little known in Canada, but vinegrowers in the Dominion will do well to be on their guard, and make themselves acquainted with its appearance and habits. "Forewarned, forearmed" should be their motto, or it may be in their midst, and work them endless vexation and loss, before they know what is hurting them. In the Report of the Entomological Society of Ontario, for 1877, Mr. Samuel Gott, of Arkona, says: "I have already seen specimens of it, and it is my decided opinion that unless some effective remedy is found, our vines will suffer much from the effects of this tiny insect upon their leaves, and especially their roots." The difficulty of finding any such remedy, may be seen from the fact that the 20,000 fr. offered by the French

Government remain unawarded, and that it is now proposed to cut a canal from the River Rhone, and flood the vineyards in winter, at a cost of 102,000,000 francs, in order to save "60,000 acres, yielding products amounting to 200,000,000 francs a year.

"The restriction on the importation of plants of any kind whatever, and from any quarter, is most rigid. A consignment of the newly discovered aroid, from Sumatra, was subjected in Genoa to formalities and delays that seriously compromised the safety of the tubers. In some places gentlemen must dispense with the ordinary floral decorations in their button-holes. On the French frontier no one is allowed to gather a bouquet of wild flowers in foreign soil and take them across the border for fear that the much-dreaded pest should exist in it. All scientific reasoning seems to be at an end in the minds of the Italian Government officials." Nat. Feb. 20, 1879.

These words called out the following reply :

"It was soon found that to forbid the importation of foreign vines and fruit-trees was quite ineffectual, as it only gave occasion for smuggling on a grand scale, encouraged by certain horticultural firms, who did not fear to compromise their respectability by so doing. They began by introducing the prohibited plants in their leafless state, labelled 'choicest exotics,' to the utter confusion of the Custom house officials, who, not being naturalists, were at a loss how to act, until the government was obliged at last to send the order that no live plant should pass the frontier." This will give some idea of the difficulty of excluding such a pest. The same periodical reports that an Australian insect (*dorthesia characias*) probably introduced with the blue gum tree, is killing many of the orchard and other trees in California. This same insect has proved a great pest in South Africa.

In this connection I should like to commend to any who may read these pages, the works of the Entomological Society of Ontario. All interested in the farm and garden in the Dominion, should know of its existence, and give it all the aid in their power, especially by becoming members. The monthly numbers contain many valuable papers, chiefly original and interesting to Entomo-

logists, while the annual reports are full of excellent information for the general reader. The latter alone, is worth the whole subscription for the year (\$1) to the practical man. They contain full accounts of many of the insects here briefly alluded to, and may be obtained from the President, Wm. Saunders, Esq., or the Secretary, Joseph Williams, Esq., both of London, Ont. In particular, I would refer vine-growers, in view of the fact that attempts are now being made to carry on this branch of Horticulture on a larger scale in Canada, to the brief history of this Grape-vine Louse in the Annual Report for 1874,* by the Revd. C. J. S. Bethune.

The details above given bring out strikingly the facts that, as with plants, so with animals the march is westward; that European animals cross the Atlantic and settle in America, multiplying with enormous rapidity, and doing incalculable mischief; while, with a few exceptions, American animals fail to establish themselves in Europe, or if established there, serve in one notorious instance to do appreciable mischief.

It is also worthy of remark in passing, that the European insect often far surpasses the native of similar habits and habitat. "The imported Onion-fly is a grievous pest in the East." The native onion-fly has only been noticed by a few observers in the West. "The imported Meal-worm swarms throughout the whole country, and is a great pest; the native species is comparatively rare, and scarcely known to the millers and flour dealers." "The native American Bark-louse is of little moment; the imported Bark-louse is one of the most dangerous foes of the apple tree in America."

In view of these facts, what will be the future history of the Colorado Potato Beetle? (*Doryphora decemlineata*). Will it cross to Europe and devastate the potato fields there as it has done here? Or will the Atlantic, or rather the European condition of life on the other side, prove more than a match for it? It is hard to

*"I should like also here to suggest to the Council of the Society, the advisability of advertising and selling their Reports separately, and at a certain price, so that those who do not wish to read the technical details of the monthly numbers, may be able to obtain these exceedingly useful annual summaries."

reply positively. This insect has abandoned its native food plant in the West, and has travelled eastward, ravaging the fields and gardens on its way, until now it stands on the Atlantic seaboard longing for more worlds to conquer. Advanced detachments have crossed, but have thus far been met with characteristic energy and uncompromising determination, both in England and Germany, and stamped out. This forlorn hope will be followed by others. Government edicts may do something, but cannot permanently prevent their spread unless other causes combine to check them. The Grape-vine Louse has largely abandoned its native food, and seized the European vine, with results in Europe detailed above. The Potato Beetle may do the same. On the other hand the Plum-weevil has seized the European stone fruit, and its ravages are here enormous, but it has not yet crossed. The ash gray Blister-beetle destroys the European Windsor bean in America, but is in England unknown. The same is true of the Bean-weevil, and several other native insects. If the analogy of the majority may be trusted, there is ground for hope that with care these pernicious insects may be unable to injure the potato fields of Europe. New enemies may also there assail them and find in them the very food of which they are in want. But there is not sufficient ground for confidence. No precaution should be neglected, no order in council revoked. The risk is too great and the possible consequences too disastrous. The presence of this beetle in the potato fields of Ireland might renew in part the horrors of 1847, and start a new tide of Irish emigration to Canada and the States.

The facts above mentioned show conclusively that the European Fauna acts precisely as the European Flora was shown to do.* Its members cross the Atlantic to America; they settle in the country; they multiply faster than at home, oust the competitive native races, and as most of them belong to what we call the injurious classes, they work here destruction unknown to the old country. How shall we account for these facts?

Some years ago the late Mr. Benj. D. Walsh published the fol-

* See Report for 1877.

lowing remarks: "Our animals mostly belong to an old-fashioned antediluvian creation, not so highly improved and developed as the more modernized creation which exists in Europe. Consequently they can no more stand their ground against European competitors introduced from abroad than the Red Indian could stand his ground against the white Caucasian race. If by chance an American animal finds its way to Europe it can as a rule no more stand its ground there than could a colony of Red Indians in England." To a cause somewhat similar I last year attributed the wholesale migration of European weeds to this country, and their naturalization here. And there can be no doubt that Mr. Walsh has suggested a real cause. No naturalist doubts that America with its opossums is far more antiquated, zoologically speaking, than Europe, where all such old-fashioned beings are shut up fossil in the rocks, and would look strangely out of date if, Rip Van Winkle-like, they should come to life again. This higher development of European life—a result of the sharper competition there existing between closely allied forms of the more recent geological changes which have there occurred—gives the European immigrant an advantage in the struggle for life wherever conflict occurs. And in many instances this cause alone is sufficient to ensure its supremacy over its old-fashioned antagonist.

But I think this cause alone, however real, is insufficient to account for all changes similar to those mentioned above which have occurred. For a complete solution of the problem the following additional considerations require mention.

The introduction of so many European *plants*, and their wide extension over this continent, must, to some extent, have contributed to produce this result. Many of these imported plants are the natural food of some one or more of these imported insects. The weeds alluded to last year, the various field crops and garden vegetables, maintain their peculiar insect population. So great an abundance of insect food as is supplied by the spread of these plants over the whole continent could not but be attended with an increase of these insects. Where food is abundant there population rapidly increases, both insect and human. The sudden

development over America of the productions of another hemisphere could not but be attended with a disturbance of the balance of life which cannot at once be removed. European insects hold carnival in such a vast expanse of country, covered with imported vegetables and other plants long familiar to them, but never in such abundance.

Moreover on crossing the Atlantic many of these insects left behind them their hereditary foes—the parasites that kept them in check in Europe. Every one of them is there a prey to some one or more of these, by which its excessive and permanent multiplication is prevented. It is easy to see what must be the effect of introducing a European insect to the wide fields and gardens of America, and at the same time leaving behind its most deadly enemy—its most useful parasite. The new country is a perfect paradise for the happy new-comers. They have it all their own way, and multiply and feed and multiply again until stopped by the mere exhaustion of their food supply. No parasite burrows in their bodies or sucks their blood, and the ruin they can in this condition work for man is simply incalculable.

The most destructive insect mentioned in this paper, the Wheat-midge, is exactly in this condition. "To this day," says Mr. Walsh, "it is not known that any indigenous parasite has attacked the wheat-midge since it landed on our shores," some fifty years ago, nor, with one doubtful exception, "does any North American cannibal insect prey upon it within the United States." And Dr. Fitch, writing in 1862, says: "How does it happen that the midge in this country is vastly more destructive than in its native haunts? I can impute it only to one thing: The other insects which have been created for the purpose of quelling this species, and keeping it within its appropriate sphere have never yet reached our shores. We have received the evil without the remedy."

The Currant Saw-fly mentioned above, is at present in a similar condition of freedom from its natural enemy. Hence the enormous and unchecked depredations which it annually commits. Many others might be added to the list, which live here in perfect security, with the Atlantic between them and their destroyers.

It has often been suggested that, as man has accidentally introduced so many injurious insects from Europe, he might intentionally introduce their parasites. This is reasonable, and would undoubtedly prove of great advantage to the country. Possibly it will some day be done in that happy future, where science and intelligence have more weight in the councils of the nations, when officials are appointed to office because they are competent to discharge its duties, and not because of their political opinions, when men can combine for the national good as well as for party purposes, and when so-called statesmen regard the permanent weal of the nation, at least as much as their own personal aggrandizement. But that day is not yet. To quote Mr. Walsh again, "Is it to be expected that a crowd of men, members of legislatures, whose heads are mostly full of such important things as cognovits, and assumpsits, and demurrers, and torts, and caucuses, and conventions, should condescend to think about 'Bugs'? What do they know about farmers, except that they have got votes?" Meanwhile the Wheat-midge, Currant Saw-fly & Co., do just as they please, no one interfering to check them in a way that would prove most effectual. And why? Because the cost and toil would come on the individual, and the advantage and profit on the nation. Could these parasites be introduced and covered with a patent in Canada and the United States, they would be here before another year had passed, some one would make a fortune, and the wheat-growing part of the community would be enriched. Such work is national work, and some day the nation and its legislators may find time to do it and to pay for it.*

But when everything has been done which science can suggest to remedy or palliate this great evil, I fear there will always remain a difference between this continent and England, to the disadvantage of the former. Nature indicates this. In a hot climate, or

* If we may infer from the analogy of the Hessian-fly, of the results of introducing the parasites of the Wheat-midge we must augur very favourably. To such an extent is this pest annually destroyed, that out of more than one hundred specimens collected last year in this locality, I could scarcely obtain a single fly. Most of the "flax-seed" yielding its well-known four-winged parasitic fly (*Ceraapteron destructor*.)

in a climate where the summer is hot, insects are always abundant. The cool summers of England are unfavorable to them. The hot American summers are highly favorable. Granting then, that all the European parasites are some day introduced, and that they do their duty to the utmost, yet a larger number of insects will be annually produced. It is true a larger number will be destroyed. But their destruction by parasites will not entirely remedy the evil. Every Entomologist knows that most insects do their mischief while in the larval condition. That is pre-eminently, and often solely their eating stage of existence. Now, most parasites lay their eggs in the body of the larva, not destroying its life, but preventing the development of the perfect insect. It is evident, therefore, that the advantages accruing from the action of the parasite—immense as it would be—would be limited to checking the multiplication of this species by one means. The number of both would be increased, pest and parasite, but greater mischief would nevertheless be done by the former before its destruction was accomplished by the latter. Thus, how great soever the advantage of importing the parasite would be, and I can hardly over-rate it, the entomologist is too sanguine who anticipates from their presence immunity from insect depredations equal to that enjoyed in England.*

The best remedy for this evil will not be found until a better system of farming is adopted—until the plan of skinning the land and going west has given place to permanent occupation—until the farmer sows what he hopes to reap. Many of these insect depredators would be serious in England were the average yield there no greater than it is here. But from an average of twenty-eight bushels of wheat to the acre, the farmer does not miss what would cause heavy loss if taken from an average crop of thirteen to fifteen bushels. Better and cleaner farming, heavier crops from less land, combined with what most Canadian and American farmers excessively dislike—close and constant attention to *little things*—

* The opinion here expressed is borne out by the damage annually caused by the Hessian-fly, and cabbage Butterfly, though parasites of both these insects have been in America for many years, and are destroying them wholesale.

will be the most successful and practical remedy for the evil—perhaps the only one within the reach of the individual.

In conclusion then, we see :

1stly. That European insects, like European weeds, migrate freely to America and become naturalized here.

2ndly. That when here, they multiply at a rate unknown in Europe.

3rdly. That their depredations are consequently on a scale unknown in Europe.

4thly. That many of them are here free from parasite and other enemies, which checked their increase there.

5thly. That American insects, with few exceptions, fail to emigrate to Europe and become naturalized there.

6thly. That this difference between the eastward and westward migration of animal life is due to the several causes above named—the higher development and greater complexity of European life, and consequent superior ability to contest the ground—abundance of food, absence of European enemies, and slovenly farming and gardening.

7thly. That even after all has been done to remedy the evil that can be done, there will probably yet remain a greater loss from the ravages of insects than is experienced in England, which can only be countervailed by increased yield from the same extent of land—a result of greater care and better farming. Eternal vigilance is the price of a good crop.

SOME OF THE INSECTS THAT FREQUENT THE
ORCHARD AND GARDEN—UNDER WHAT CIR-
CUMSTANCES THEY INCREASE UNDULY—WHAT
INSECTS TO SPARE—WHAT TO KILL, AND HOW
TO KILL THEM—WITH OTHER USEFUL IN-
FORMATION.

BY REV. T. W. FYLES, COR. MEM. OF THE NAT. HIST. SOC.,
MONTREAL.

Shall we wage indiscriminate war against insects ?

“The noxious insect that intrudes may die.” This is the judgment of the poet Cowper, and it appears to be a reasonable one ; but we must not suppose that every insect is noxious, nor must we regard every appearance of an insect as an intrusion. It is well for the Fruit-grower and the Horticulturist to acquire a knowledge of Entomology, that they may be able to destroy *judiciously*. An indiscriminate slaughter of insects is an offence against Nature, “who, when she formed, designed them an abode.”

Consider the case of the caterpillar of the Willow-herb Sphinx (*Deilephila Chamænerii*):—

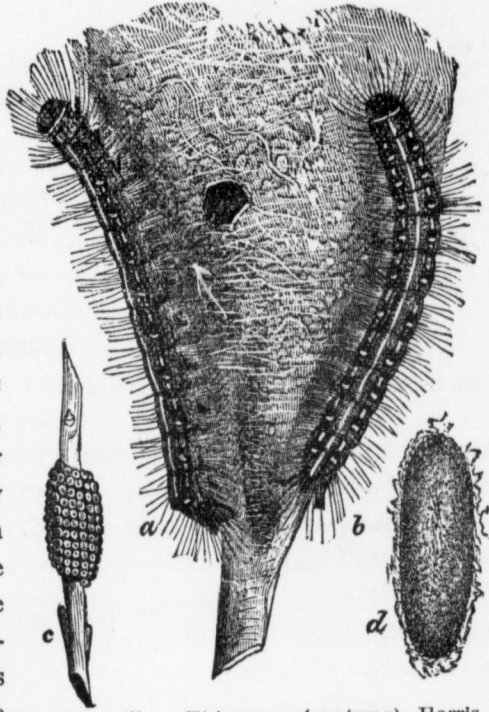
In neglected spots and corners the Willow-herb (*Epilobium angustifolium*) is wont to spring up. Feeding on this plant certain caterpillars of a formidable appearance, of a green or madder-brown hue, having two rows of orange spots down the back, and an anal horn, may often be met with. They grow to a considerable size. The ordinary gardener finding them would certainly kill them. But they are perfectly innocent. Their food-plant is of no value. The moth which they ultimately produce is very beautiful ; and, being one of the nectar-sipping insects, plays a useful part in the economy of nature by scattering pollen to aid in the fertilization of plants. A person killing the insect is not merely guilty of an act of unnecessary cruelty : he is destroying a friend.

Caterpillars found feeding on weeds, like those of *Vanessa Milberti* on Nettles, and *Danaïs Archippus* on Silk-weed should not be killed. The probability is that they will eat *nothing* but weeds.

HOW TO DESTROY INSECTS.

To destroy the troublesome *Clisiocampa Americana*, the best plan is to look, in the winter, for the patches of eggs on the twigs of the apple-trees, and to remove them with the thumb-nail, and then cast them into the fire. The red-humped caterpillars of *Notodonta concinna* will be found, in the early stages of their growth, lying closely packed, side by side, on a few of the leaves of the apple-tree. So will the striped caterpillars of *Pygæra ministra*. The leaves so occupied should be picked and trodden with their burdens under foot. A free use of hellebore dissolved in

water, and applied by means of the water-can and rose, will free the berry bushes and canes from the larvæ of Saw-flies and Geometrina. The war against Aphides should commence as early in the year as possible; for it should be borne in mind, that only every eighth or ninth generation of plant-lice indulges in connubiality. Winged males and females appear in the Autumn, (or early Spring). All the succeeding broods consist of wingless females, to the eighth generation. Males then appear again, to reorganize Aphidean society for another succession of broods. A little cluster of plant-lice, overlooked, will increase and widen its operations,



Tent Caterpillar (*Clisiocampa Americana*)—Harris.
a, b, larvæ; c, cluster of eggs; d, cocoon.

till at length a whole plant will suffer; whereas an early removal of it would have freed the plant for the whole season. The larger caterpillars should be carefully "hand-picked."

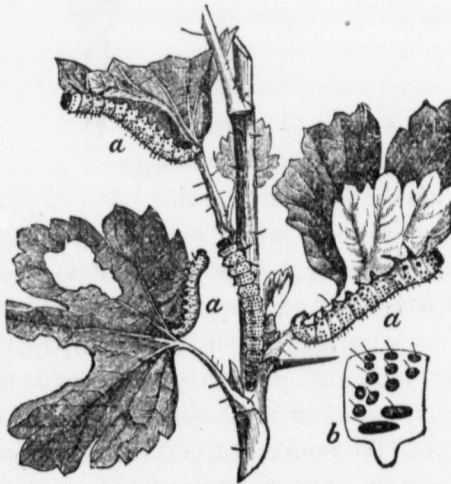


Imported Currant Worm.
Leaf showing eggs (1), and holes which the young worms make (2).

HOW IS IT THAT INSECTS
SOMETIMES INCREASE UN-
DULY?

Under a combination of favorable circumstances, insect tribes will increase, in some instances to an alarming extent, and then, after a time of ascendancy, dwindle away till they all but disappear. The introduction of a species from a distant place is usually followed by a rapid increase of that species. This probably is largely owing to the absence of the natural counter-checks to its kind, *ichneumons*, &c.

An English naturalist, on his arrival in this country some years ago, could not fail to notice the paucity of white butterflies. A few specimens of *Pieris oleracea* would be all that he could meet with. But about the year 1858 the smaller Cabbage Butterfly (*Pieris rapæ*) was introduced from Europe, probably in cabbages thrown out from the steamships. In a few years it overspread the land, and great was the consternation it excited. I knew a farmer who, having noticed the exuviae of the



Imported Currant Worm.

a, a, a, larvæ; *b*, a magnified joint of body showing black tubercles.

caterpillars on his cabbages, would not keep the vegetables for his own consumption but kindly vended them in the neighboring villages, because, as he told his friends in confidence, *he was sure they were unfit for food.*

The introduction of the English House Fly to New Zealand was followed by so startling an increase as to attract the notice even of the Maories, who, in one of their songs, says—

“As the Pakeha fly has driven out the Maori fly,
As the Pakeha grass has killed the Maori grass,
As the Pakeha clover has slain the Maori fern,
So will the Pakeha destroy the Maori.”

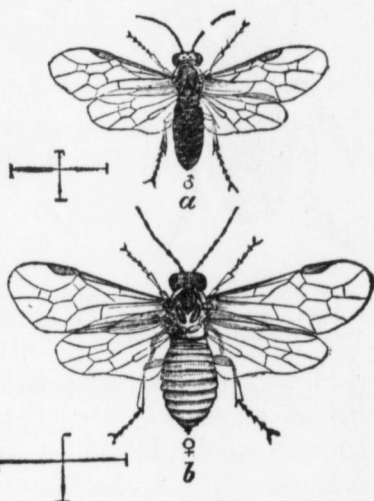
In America we have had never-to-be-forgotten instances of the rapid increase of imported insects, in the Hessian fly—supposed to have been brought over in straw, to Staten Island, by the troops under Sir W. Howe, and the Potato Beetle—for the migration of which, from the slopes of the Rocky Mountains, settlers unwittingly bridged the prairies.

The Acclimatisation Society has not accomplished unmixed good. The dreaded Phylloxera, which is ravaging the vineyards of Europe, is believed to have been carried there with new varieties of vines from America.

The opening up of a country increases the numbers of many of the insect tribes; and so does a succession of fine seasons.

Insectivorous creatures should be protected.

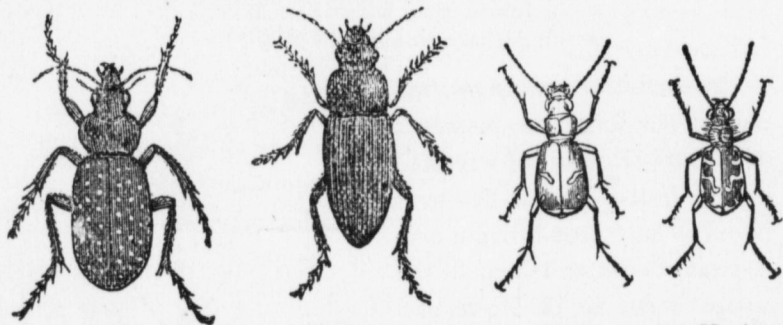
The destruction of predatory tribes of animals, birds, and insects, is often followed by a dangerous increase of the plant consumers. The man who shoots the woodpeckers may look for an increase of destructive “borers”; and he who drives away the Tits may expect trouble from a variety of pests. Once upon a



Imported Currant Worm (*Nematus ventricosus*)—Klug.
a, male; b, female, the hair lines showing natural size.

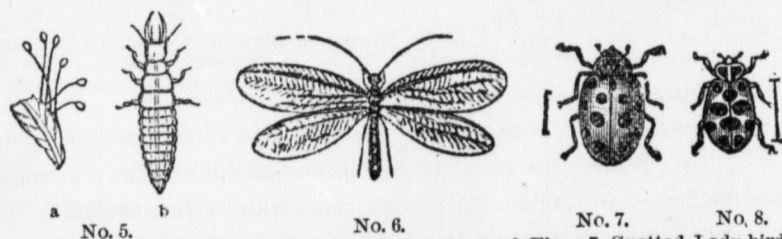
time the farmers of Rhode Island having waged successful war against the Purple Grackle were brought to see the folly of their proceedings by the rapid increase of the grubs of *Melolonthæ*, and other beetles, which destroyed their meadows by consuming the roots of the grasses, rendering it necessary for them to import hay in large quantities. It is not generally known that the skunk consumes numbers of these troublesome beetles in their imago or perfect state.

Among the predatory insects which may be ranked as the



No. 1. No. 2. No. 3. No. 4.
1. Fiery Ground Beetle (*Calosoma Calidum*.) 2. Musky Ground Beetle (*Harpalus Caliginosus*.) 3. Purple Tiger Beetle (*Cicindela purpurea*.) 4. Hairy necked Tiger Beetle (*Cicindela Hirticollis*)

gardener's friends, distinguished places are held by the Ground Beetles (*Carabidæ*), and Tiger Beetles (*Cicindelidæ*); by the Ichneumons (*Ichneumonidæ*), and Sand Wasps (*Sphegidæ*), &c.,



a b No. 5. No. 6. No. 7. No. 8.
5, 6. Lacewinged Fly. (*Chrysopa*.) Egg, Larva and Fly. 7. Spotted Lady-bird (*Hippodamia Maculata*.) 8. 13-spotted Lady-bird (*Hippodamia 13-punctata*.)

which prey on larvæ; by the *Proctotrupidæ*, which destroy the eggs of insects; by the Hawk-flies (*Syrphidæ*), Lace-winged flies (*Hemerobiadæ*), and Lady-birds (*Coccinelladæ*), which prey on plant-lice.

The larger caterpillars that infest the orchard and garden are particularly liable to attacks from ichneumons. I have seen fifty ichneumon grubs bite their way through from the inside of a *Smerinthus* larva. On examining a cocoon of *Attacus Cecropia*, I have found the whole space, which should have been filled with the pupa of the moth, occupied by a compact mass of ichneumon cocoons.

SOME OF THE LARGER INSECTS FREQUENTING THE ORCHARD AND GARDEN WHICH HAVE APPARENTLY BECOME MORE NUMEROUS IN THE E. T. IN THE LAST FEW YEARS.

PHILAMPELUS ACHEMON.

This creature, in the larva state, grows to be three or four inches long. It is remarkable for the swollen appearance of the fourth segment of its body, and for the power which it has of protruding and drawing in its head and first three segments. Caterpillars of like build are known in England by the names of *Elephant* and *Hog* caterpillars. The creature loses its horn in an early stage of its existence, but retains a raised spot where the horn fell away. Its natural food is the Virginia Creeper (*Ampelopsis quinquefolia*), but as its name (*Φιλάμπελος*) implies, *it loves the vine*.

A very beautiful and perfect specimen of the moth was taken two or three years ago, in a frame, at the foot of a large vine in the garden of Col. Hall, at East Farnham. Last season the caterpillars were rather numerous in this neighborhood.

CHÆROCAMPA PAMPINATRIX.

This species is closely allied to the preceding. I have taken the caterpillar in Brome feeding on the Creeper. In Ontario it does much mischief, but in the E. T. it is at present a rarity. In color it is green or brown; and it has a row of orange spots on the back. Its fourth and fifth segments are much swollen, and its head is very small. Its appearance suggested its name—*Chærocampa* (*χοιρος*—a pig, *Καμπη*—a caterpillar). It is one of the "Hog Caterpillars."

SPHINX QUINQUEMACULATA.

THE TOMATO WORM.

The larva of the Five Spotted Hawk Moth is one of those called Sphinx Caterpillars from the resemblance which they are supposed to bear to the Egyptian Sphinx. Under the name "Tomato Worm" it has been much vilified by newspaper correspondents. Beyond, however, feeding upon our tomatoes and other Solanaceous plants it does us no hurt. It is green, and has transverse side-lines of a lighter shade. Its spiracles are conspicuous, and it has a horn of formidable appearance. It grows to be three inches or more in length. As is the case with most of the sphinges the position of the Tomato Worm is often betrayed by the accumulations of its peculiarly moulded excrement. When full-fed the creature descends into the earth, and there forms a cist in which to pass the pupa stage of its existence. The chrysalis has a remarkable proboscis-case resembling the handle of a pitcher. The moth is a very large grey moth having five yellow spots along each side of the abdomen.

SPHINX SALVIÆ.

THE SAGE WORM.

This insect attains its full growth in September. As I have not met with an account of the larva in any of the Entomological works I have seen, I will describe it minutely. It is sepia-colored—slightly granulated like "Shagreen," and has a varnished appearance. Its anal horn is black, and rather small. The first segments to a limit beyond the pro-legs are horn-colored and semi-transparent, bearing two black, shield-shaped spots, the hinder of which is much larger than the former. The pro-legs are black. The creature has whitish transverse side-lines—the hindmost being broader than any of the others. The spiracles are black. The head has two longitudinal whitish lines.

The moth in some respects resembles the Zebra Hawk Moth (*Sphinx Kalmiæ*); but its general coloring is much darker. It is the *Sphinx eremitus*, of Hubner; the *S. Sordida*, of the Smithsonian catalogue.

SMERINTHUS EXCÆCATUS.

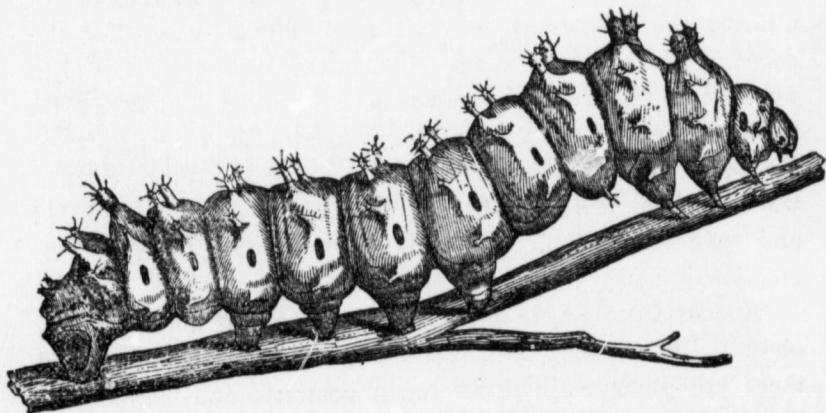
THE BLIND-EYED SMERINTHUS.

The Excæcatus caterpillar, which feeds on the apple-tree, and sometimes damages young trees in the nursery, may be known by its granulated appearance and its triangular head. It is of a light green, and has a stout horn. The moth is a beautiful object, and has rosy hind wings, ornamented with eye-like spots.

Of the other members of the family Smerinthus, I have taken in this neighborhood *S. Geminata*, *S. Myops*, *S. Juglandis*, and *S. Cerisyi*. They feed on various trees that are met with round our homesteads, but can hardly be said to be injurious. The last named is one of our rarest moths.

ATTACUS CECROPIA.

The caterpillar of this magnificent insect is the largest of those that attack our apple-trees. It will thrive also on the plum and the cherry. It grows to be four inches in length, and as thick as a man's thumb. In color, it is bright green, and it is ornamented with egg-shaped warts set with short, black spines, and variously colored—coral-red, yellow, and blue. It is a voracious feeder. A



The Cecropia Caterpillar.

friend of mine observed the growth of three individuals of the species daily, till they reached their full size. They were feeding on an apple-tree outside his window; and, in the still summer evenings, the sound of their munching was plainly heard from his

position twenty feet away. These insects afforded him opportunities for witnessing the progress of sloughing. After the head was freed, the skin was worked backward. First one segment of the body was expanded and contracted alternately, till quite free, then the next, and so on, till the change of dress was completed. The skin even of the small spines on the warts of the creature came away. The whole process occupied 20 minutes.

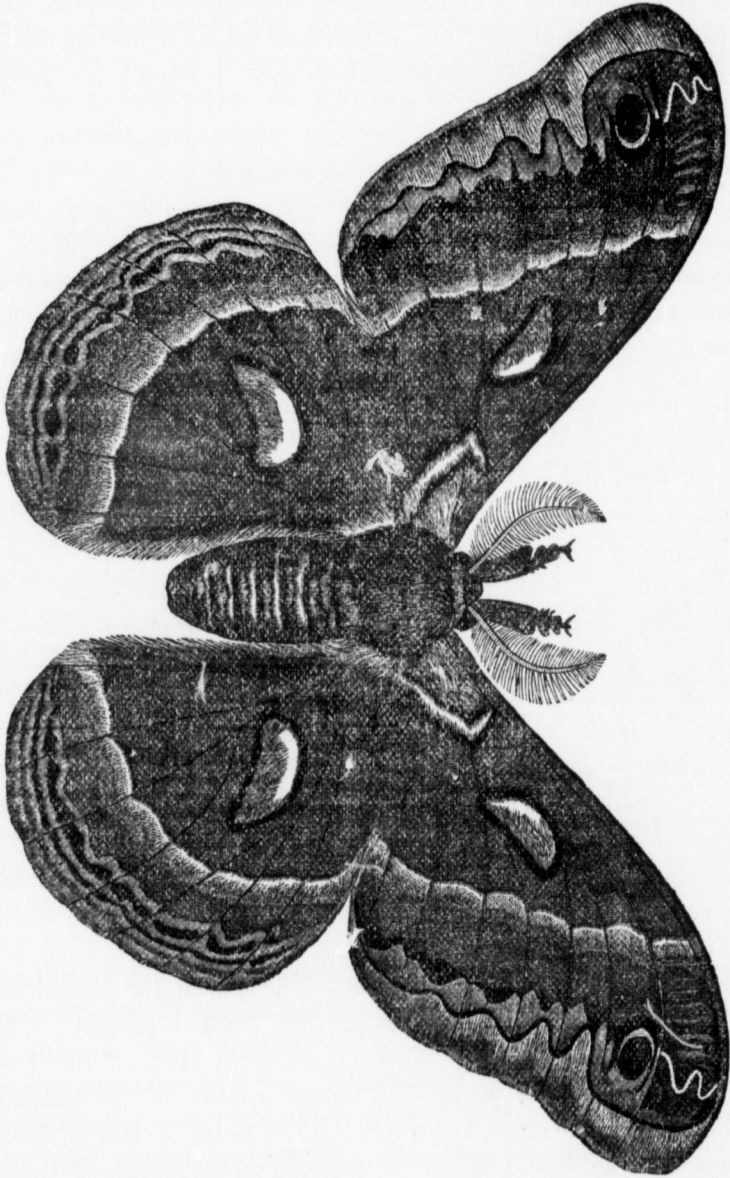
The cocoon of *Attacus Cecropia* is a marvel of comfortable security. The creature, when spinning it, has the power of assimilating it, in color, to surrounding objects. I have before me a cocoon which was spun by a larva confined in a white box, and is itself perfectly white, and another, which is of the warm brown of the bark and dried leaves of the red cherry tree to a twig of which it was attached.

I saw, when a boy, a case of these insects and their cocoons, in the Crystal Palace Exhibition, in Hyde Park, where attention was drawn to them with a view to a possible silk-manufacture. So long ago as 1759, the Rev. S. Pullein made silk stockings from *Cecropia* silk, and published his observations in the *Philosophical Transactions of the Royal Society*. The obstacle in the way of utilizing the silk seems to be the difficulty of unwinding the cocoons. It has been suggested that they should be soaked in weak lye, to which slaked lime has been added; and that the silk should be heckled and spun. The cocoons of a near relative of *Cecropia*, the *Ailanthus* moth (*Attacus ricini*), of Farther India, which feeds on the *Palma Christi* (*Ricinus communis*), are carded and spun like cotton, and the stuff formed from them is of incredible durability.

Attacus Cecropia, in its perfect state, is a beautiful and stately object. Its prevailing colors are black, white, and Indian red, and these are presented both in broad contrasts and harmonious blendings, in a variety of cloudings, wavelets, lunes and spots. But owing to its nocturnal habits, the creature is seldom seen. The nearest approach that many a one has made to an acquaintance with the *Cecropia* moth, has been the noticing of a bat-like object flitting through the gloom of a summer night.

These six are the largest caterpillars that usually trouble our

The Cecropia Moth.



gardens and orchards in the Province of Quebec. As in their perfect state some of the insects would be looked upon as *desiderata*

by many an entomologist, I would recommend horticulturists not to crush them out of existence when they fall in with them, but to pack them off uninjured to some entomologist of their acquaintance. By so doing they will, possibly, both save their trees and advance the cause of science.

THE INSECTIVOROUS BIRDS OF CANADA.

BY WILLIAM COUPER, NATURALIST, MONTREAL.

The intelligent observer will have little difficulty in determining the insect-eating birds which occur in the Province of Quebec. The species that live almost exclusively on insect food are numerous, and I will here mention them in accordance with the old classification of the Smithsonian Institution, Washington. :—

Woodpeckers (8), humming bird (1), chimney swallow (1), whip-poor-will (1), night-hawk (1), fly-catchers—various genera—(9), thrushes—*turdus*, &c.—(5), blue bird (1), wrens—*regulus*—(2), thrush—*seiurus*—(1), warblers—*dendroica*—(9), fly-catchers—*myio-diocetes*—(3), redstart (1), swallows—*hirundo*—(3), bank swallow (1), purple martin (1), wax-wings (2), fly-catchers—*virio*—(5), cat-bird (1), wren—*cistothorus*—(1), wrens—*trogodytes*—(2), creeper—*certhia*—(1), nathatches (2), titmouse—*parus*—(2),—making sixty-three species which are supposed to subsist exclusively on insects. A number of sparrows and finches visit us which are not considered insectivorous, but they are said to feed their young on insects. There are many curious deviations in the taste of some birds which are considered carnivorous. I have seen the pigeon-hawk pounce on grasshoppers, swallowing them vigorously. Last summer while collecting insects on the north shore of the Lower St. Lawrence, one warm day, a large species of the black ant swarmed on the coast, and thousands fell on the surface of the salt water. The little Arctic terns skimmed on the surface of the sea, devouring the ants, evidently with a relish, judging from the number found in the stomachs of a few shot towards evening. There

must have been millions of ants devoured that day by these little sea birds. Another deviation from the ordinary food of a sea-bird was noticed on the same coast, where the common herring gull took to the woods for change of diet, selecting the fruit of the wild raspberry; and one gull was shot with its snow-white breast deeply tinted with the rosy fluid from the berries. An adult bald eagle sent from Sherbrooke to be stuffed by me this summer had its crop full of common field peas. This is an extraordinary departure for a bird of prey. It was an old bird, of great size, and doubtless felt itself unable to plunge headlong into the water for fish. Hunger evidently compelled it to approach too near the habitation of man, consequently it became a subject for the taxidermist.

Doubtless numerous instances of this nature would be noticed were strict attention paid to the habits of birds; and, indeed, it is a question of interest to determine the cause of such a change. In the case of the terns and gulls there was sufficient fish food to be had, as caplin and launce were abundant at the time. The carnivorous dog will eat grass, and it is presumed that instinct leads him to do so when he is unwell; may it not be the case with birds which are purely marine in their nature to resort to insects and fruit by similar instinct? I believe the great bulk of our land and water birds cannot be classed in accordance with their mode of obtaining food. Although there are species which I have indicated at the beginning of this article as almost exclusively insectivorous, a few of them habitually change to fruit food at certain seasons, and such will hereafter appear when I give their separate life histories in detail. I intend to commence with the modern classification now adopted by the best American ornithologists, and which, in my opinion, is simple and perfect.

The following relates to the robin, from the pen of my esteemed and talented friend, Dr. Elliott Cones, of the U. S. Geological and Geographical Survey of the Territories. I quote from "Birds of the Colorado Valley," *Mis. Pub. XI., First Part, 1878.* It is the most accurate account of this bird which I have met with :—

THE ROBIN.

Turdus (Planesticus) Migratorius.

The robin is one of the typical thrushes—"insectivorous like most birds, in fact, but like very many others that feed mainly upon insects, they also eat berries and various other soft fruits. The robin, for instance, is extravagantly fond of the berries of the common poke (*phytolacca decandra*), and, during the season when this fruit is ripe, specimens are often found with not only the plumage, bill and feet, but various interior parts of the body, dyed with the purple juice. The thrushes are migratory in the United States. They are not properly to be considered gregarious, though some of them, like the robin, go together in troops of hundreds at certain seasons. They are arboreal in general habit, yet much of their time is spent on the ground in search for worms and insects. To illustrate the case again, in the instance of the familiar robin, every one will recall the sprightly excursions of this bird on the green sward of our parks and gardens during the breeding season, and remember how swiftly it runs, with lowered head; how it then draws itself up at full length, displaying its trim and shapely form to best advantage; how then, satisfied that no danger is to be apprehended, it tugs at a grub that lurks in the roots of the grass, and finally bears it away to the nest on a bough of the nearest apple tree. The mode of nesting varies according to the species; most of the thrushes build upon trees or bushes, but some, less ambitious, are content to nestle on the ground. The order of their architecture is never elaborate or ornate; the nests, in fact, are rather rude, bulky and inartistic structures, more notable for strength and stability than for beauty of finish; they are built of leaves, grasses, rootlets, and similar materials, often strengthened with wood. The eggs are usually four, five or six in number, blue or green in color, with or without reddish spots; some of the most closely-allied species lay eggs distinguishable with as much certainty as the birds themselves. Under favorable circumstances, two, or even three broods of young may be reared in one season. The great voracity of young insectivorous birds is perhaps in no

case more strongly illustrated than in this group. If the Robins were to feed all other seasons exclusively upon the fruits of the orchard and garden, we should still remain in their debt for the numberless thousands of noxious insects they destroy during the period when they are rearing their young. The destruction of such useful birds cannot be too severely reprobated, even upon selfish ground, to say nothing of the higher and more generous motives which should suffice for their protection. For we are not alone indebted to the Thrushes as friends favoring our economical projects. They lay strong claim to our regard as musicians. It is true that the song of the Robin is a humble effort, remarkable for nothing so much as for its heartiness, simplicity, and persistence; yet some of the Thrushes, like the Hermit and the Wood Thrush, sing with wonderful power and effect." The Robin is found in all parts of North America. It also occurs in Greenland, on the islands in Behring's Sea, on several of the East India Islands, as Bermuda, Cuba, and Tobago; and through Mexico to Guatemala. It has even been known to cross the Atlantic, having been several times shot in Europe. For though it is a woodland bird, like all of its tribe, and therefore scarcely to be found in certain portions of the country, where desert or prairie fail to afford requisite conditions; nevertheless, in the course of its extensive migrations, it may at least pass over such tracts. The Robin is strictly a migratory bird, like most insectivorous species which inhabit the northern hemisphere. There is a general north and south movement of the species as a whole, during the changing seasons of the year—a movement directly related to the sources of food supply. Nor should it be inferred from the fact that Robins may be seen in a given locality during the whole year, that the tide of migration has not passed; for it may be that the individuals present at one season are not the same as those that remained during the previous period of the year. The fact appears to be, that, as a rule, there is a replacing of one set of individuals by another, so that though the bird as a species may be resident, the birds individually have obeyed the migratory impulse. Wide as the Robin's distribution is, the limits of its summer and winter residences are com-

paratively little narrower. Its breeding-range extends from Arctic America to the Alpine regions of Mexico ; its winter home from the Northern States to Central America. It is a hardy bird, capable of enduring cold to the freezing point of mercury. Thus, it will be seen, the bird is "resident" in one sense, throughout the greater portion of its range. Nevertheless, the general migration favors its presence in greatest numbers in the Southern States during winter, and in the Northern during the summer.

The Robin is a great eater of berries and soft fruits of every description ; and these furnish, during the colder portions of the year, its chief sustenance. Some of the cultivated fruits of the orchard and garden are specially attractive ; and no doubt the birds demand their tithe. But the damage done in this way is trifling at most, and wholly inconsiderable in comparison with the great benefit resulting from the destruction of noxious insects by this bird. The prejudice which some persons entertain against the Robin is unreasonable ; the wholesale slaughter of the birds which annually takes place in many localities, is as senseless as it is cruel. Few persons have any adequate idea of the enormous—the literally incalculable number of insects that Robins eat every year. It has been found, by careful and accurate observations, that a young robin in the nest requires a daily supply of animal food equivalent to considerably more than its own weight. When we remember that some millions of pairs of Robins raise five or six young ones, once, twice, or even three times a year, it will be seen that the resulting destruction of insects is, as I have said, simply incalculable. I have no doubt that the services of these birds, during the time they are engaged in rearing their young alone, would entitle them to protection, were the parents themselves to feed exclusively upon garden fruits for the whole period. But at the same time the diet of the old birds is very largely of an animal nature. Nor is this the only season during which the destruction of insects goes on. Upon the first arrival of the main body of the birds early in the spring, long before any fruits are ripe, they throw themselves into newly-ploughed fields and scatter over meadows, lawns, and parks, in eager search of the worms and

grubs, that, later in the season would prove invincible to the agriculturist, were not their ravages thus stayed in advance by the friendly army of Robins.

It is a matter of congratulation that the good services of the Robin are becoming duly appreciated, thanks to the timely and judicious interference in its behalf on the part of many of its friends ; among whom, no one, perhaps, deserves higher praise for his active and successful exertions than Dr. Thos. M. Brewer of Boston. The bird is now very generally protected by legislative enactments, during a portion of the year, at least ; it is to be hoped that the laws may be made still more stringent, and the "close" time become co-extensive with the year itself. As an object of "sport" the Robin can possess no attractions, save to idle children of larger or smaller growth ; while its commercial value, as an article of food, is wholly inconsiderable. There are, therefore, weighty and cogent reasons why the Robin should be protected by law at all seasons ; for there would rarely, if ever, be difficulty in gaining permission, upon proper representation, to destroy the very few that might be required for scientific purposes, or to please the capricious palate of an invalid.

There is little need to pursue the history of the Robin to the details of the bird's daily life ; upon such points the children are competent ornithologists ; and those of us who may have forgotten our early experiences need only look out of the window at the right time. A word of record respecting the nest may, however, not be out of place. This is one of the most conspicuous pieces of bird-architecture about the homestead—the kingbird's, the oriole's, and the various swallows' nests alone approaching it—in this respect. The horizontal bough of an orchard tree, not far from the ground, is a favorable situation ; though the robin is not very particular, and will sometimes build, like the pewit flycatcher, in old and unsuspected nooks about an out-building. The nest is too bulky for concealment, and no art is attempted. A mass of the miscellaneous material, chiefly of vegetable nature, such as leaves, weed-stems, moss, grasses, and rootlets, but sometimes including hair or wool, surrounds a rather neat cup of mud, which,

in turn, is lined with finer vegetable fibre. The shape of the nest varies, of course, with the character of the support upon which it rests; in size it is about five inches wide, or deep, with a cavity half as large, the walls and flooring being very thick and substantial. Such nests do not readily yield to the weather. The eggs, numbering five on an average, perhaps, measure from an inch and one-eighth to an inch and one-fourth in length by three-fourths to five-fifths in breadth. When fresh, they are of a uniform, rich, greenish-blue color, without spots; after being blown for some time, especially if exposed to the light, they fade considerably, becoming of a lighter greenish, with less blue shade."

ON THE DISTRIBUTION OF INSECTS AND PLANTS.

BY WILLIAM COUPER, MONTREAL.

The article "on the Migration of Plants from Europe to America," by Prof. E. W. Claypole, in the Third Report of the Montreal Horticultural Society, is both interesting and instructive, and I trust that we will have the pleasure of perusing another contribution from his pen on the same subject. We are in our infancy in the investigation of phenomena of this nature. Insect and Plant Migration was one of the principal studies of the late Prof. C. V. Riley, and I have devoted part of my time in considering the same subject. In my address, when retiring from the Presidency of the Montreal Branch of Canadian Entomologists, in 1875, I spoke of the introduction of insects and plants from Europe to America (see Annual Report of the Entomological Society of Ontario, 1875). My remarks led Prof. H. A. Hagen to write as follows:—

"CAMBRIDGE, MASS., June 12th, 1876.

"MR. W. COUPER,

"DEAR SIR,—You will allow me to say to you my best thanks for your interesting address to the Montreal Branch of the Entomological Society. I was much interested in reading your remarks about *Pamphila comma* and *Manitoba*. Without any doubt, such obser-

vations and examinations about the identity of American and European species, will become every year more important. Just for this purpose, and just with the purpose to help every body in such questions, I have procured here a large European collection, very carefully determined by good authority, and of many species of Lepidoptera which I have, doubtless, in good condition. But there is very rarely an application for them, and several times I was inclined to give up this part of the collection. I have the pleasure to offer to you the assistance of this part of the collection *for all such questions*. If you will name the species you like to have, and I have doubles, I will send them directly, and you may retain them without anything given in exchange. Even for questions of importance, I would not shrink to send the second specimen. (I may here state that Dr. Hagen had at that time a reference collection of European insects in the museum at Cambridge, containing nearly half of the known species).

"Some of your remarks I misunderstand, perhaps,—you say *Vanessa antiopa* 'holds undoubtedly its metropolis on this continent,' but it is a very common species throughout the whole of Europe and Northern Asia, I think all the eastern part of Siberia.

"You say that American plants do not become naturalized in the old (?) world with anything like the facility, &c., (see address, page 9); but the Canadian poplar is now nearly a pest in the whole Northern Europe and Russia. *Pinus strobus* grows everywhere easily, and *Robinia pseudoacacia*, only introduced 70 years ago, is everywhere. Some people in St. Petersburg ceased to have the North American trees or shrubs in the hot-houses, and have them in the open air,—they keep perfectly well in the climate, and grow luxuriantly. One fact is, of course, extremely interesting, that some of these plants have brought over enemies—for instance, *Robinia pseudoacacia* and *Pinus strobus* are free from insects, and, at least, the first never attacked by European ones. *Populus canadensis* has plenty of enemies. Considering the North American weeds, I can send you a book on European weeds and their propagation, which is very interesting. I have compared this list, and find that two-thirds of the European weeds are also

in the catalogue of the North American plants, and from the last third, perhaps, a number which I cannot identify. I remember when I was two years ago in Minnesota, and saw not far from the depot some plants with flowers, I hastened to the spot, and was disappointed in finding, in the prairie, a most common European weed.

"That European insects bring over with them the parasites, is proved by *Pieris rapae*, and probably by many others not yet so well observed. American insects are rarely introduced. *Blatta Americanus* is found in the whole of Europe and Russia, but only in sugar refineries. I don't know any American insect living in open fields. I believe, to be sure, that a part, perhaps the larger part, of the identical species *are not introduced*. For the insect, of which the larvæ live in water, for instance, the dragon-flies, there can be no doubt that they are equally *truly American* insects or European ones. In other instances, it is often not to understand how the immigration was possible. For instance, by Dungballes, *Aphodius*, &c. The introduction of other insects is very curious. In Ceylon, in the mountains, on coffee shrubs, live a number of *Psorina*. Now, Mr. B. P. Mann found at least two of the Ceylon species on coffee trees near Rio, and ascertained that fifty years ago shrubs were introduced to Rio from Ceylon. But the coffee shrubs in Ceylon were also introduced—I can't say from where, and so perhaps those little insects belong to Arabia.

Very truly yours,

DR. H. A. HAGEN."

The connection between fruit grower and entomologist is apparent from the fact that the former cannot devote his whole attention to the pests which, year after year, visit the orchard and garden, while the students of insect-life are continually on the lookout for new forms. Being acquainted with the genera and species already known to have attacked various fruit-trees in this country, little difficulty will be experienced in forming an opinion or arriving at a proper method of destroying them.

It is also important that the fruit grower should have access to

books in which investigations of entomologists and other observers are recorded—such as the reports of various agricultural societies throughout the United States and Canada. In fact, a library of this nature should contain no other works but what relate to the objects of the Association. In concluding, I would suggest that members make a strong effort to collect such books as will promote the object they wish to study. The nucleus of such a library could be formed by the collection of the above reports. They will cost little, and with little energy the result would be beneficial to the Fruit Growers' Association of the Province of Quebec.

FRUIT REPORT OF THE COUNTY OF BELLECHASSE.

BY REV. F. T. PARADIS.

Circumstances not having allowed me to procure information for the whole County of Bellechasse, I will confine myself to the attempts at fruit culture, during the past eight years, at St. Raphael, in the latitude of Quebec. Our soil is partly alluvial and of good quality, although rather fresh and partly hilly where it is dry and light. Everywhere the subsoil is porous, thus dispensing with artificial drainage. The exposure is good, as we are situated in a mountainous country, in full view of the St. Lawrence, and although the winter cold is intense, late spring and early autumn frosts are comparatively rare. It is noticeable, however, that the plum trees which are sheltered from the north and north-east winds, thrive better than those exposed to all the winds. On the contrary, our apple trees require protection against the heat rather than against the cold, a southern eastern exposure having always appeared unfavorable to our delicate varieties.

We have tried over forty varieties of apples in our orchard. Some have resisted well, as for instance, the Fameuse, Duchess of Oldenburg, Peach, Brunswicker, Tomato, White Astrachan, Alexandre, St. Lawrence, Sir John Richardson, Golden Russet, Keswick Codlin, and ten varieties of Siberias, Queen's Choice,

Pyramid, Cleveland Yellow, Peach, Transcendant. These varieties have flourished as well in the lightest as in the heaviest soil. On the contrary, the Canada Baldwin, Canada Russet, Red Astrachan, English Russet, and Winter Pippin, have succeeded better in the latter soil. Derby-see-no-further, Hopkin's Porter, Black Oxford, Grime's Golden, Bailey Sweet, demand from us the most assiduous care, especially during the first two or three years. The repeated pinching has helped us marvellously in acclimatising these latter varieties, which now ripen their wood properly before the first frosts of winter. We have not succeeded with the Rhode Island Greening, Spitzenberg, Express, Baldwin, Hawley, Hubbardston's None-such, King of Tompkin's County, Rambo-Espion du Nord. During the summer of 1871-72, we had to protect our trees from the ravages of the *Saperda Candida* grub. Since then we have suffered little.

In the sheltered parts of the orchard we cultivate the following varieties of plums;—Lombard, White Egg, Bradshaw, Reine Claude, Damason, D'Agen, Victoria, Nota Bene, General Hand. The Nota Bene (Corse's), is remarkable for its vigor and early fruit, being superior in these qualities to the Damason and Reine Claude, long since cultivated in this locality. The other varieties generally succeed well. The *Curculio* has not yet made its appearance in these parts.

With regard to cherries, we have in full growth only the early Richmond which agrees with our soil and climate.

FRUIT-GROWING IN ARGENTEUIL.

BY REV. R. HAMILTON, GRENVILLE, Q.

Although almost every part of this large county is well adapted to the production of fruit, especially apples, very little is grown. This is not due to lack of enterprise on the part of the inhabitants, but apprehension that the climate is not favorable to the production of any but wild apples, or crabs. Very few farms are without a

few apple trees, but they are almost invariably wild or seedling apples. Not that grafted apples have never been planted, but that those who did plant bought from tree pedlars and agents, who very rarely indeed supplied good trees, and when the trees themselves were good, they were of sorts unsuited to the climate. Thousands of dollars have been spent by the farmers, time and again, for trees, with the same result continually—failure, so that a great many have given up in despair of being ever able to produce fruit from grafted trees. And yet several sorts of good quality do succeed, as I have seen in several instances. Fameuse, St. Lawrence, Peach, Duchess of Oldenburg, Pomme Grise, and some others, are found bearing good crops on healthy trees. And these are found in widely separated localities, so that it is not merely in certain favorable spots that they are produced, but wherever reasonable pains are taken in the preparation of the ground and in the choice of sorts. I have not seen nor heard of an orchard of any considerable size of grafted trees. In an orchard in Grenville, planted by the late Alexander Beauchamp, there are about twenty Fameuse trees, and a large number of others grafted from fairly good wild apples. The Fameuse in this orchard were very handsome fruit last year, and the trees are from fifteen to twenty years old. Trees that stood the test of so many years may be called hardy. Mr. Wilson, of the Calumet, has a small orchard of grafted trees of from twelve to twenty years that are quite healthy and produce sound, well-flavored fruit. Mr. William Heatlie, of Chatham, has a small orchard in which are a few grafted trees that succeed admirably, among others are Fameuse, St. Lawrence, and Duchess of Oldenburg. These bore very handsome fruit last year. Mr. David Ogilvie, of Grenville, also has a small orchard. Some of his trees are grafted, though not with any well-known old sorts. One sort that he has and calls Fameuse, while it resembles it, is not that apple, but probably a seedling of the neighborhood, though Mr. Ogilvie does not know anything of its origin. It is a good keeper. Mr. John Thomson, of Chatham, has also in his orchard an apple called Fameuse, not true, and unlike Mr. Ogilvie's. He has also a sort called "Pomme Grise," which resembles very much

an apple described in the report of 1877, and called "*Pomme Grise tendre*." Mr. Gowanlock, of Chatham, has a young orchard of very healthy and handsome trees, that are with two exceptions seedlings, and the majority of them are crabs, some of them yielding very promising fruit. Fully three-fourths of all the apples of this county are crabs. Some of them are, I believe, superior in appearance and flavor to our most widely cultivated kinds. In the front of Chatham a good many young trees have been planted of late years, some few of which have stood. I was shown a beautiful specimen of *Duchess of Oldenburg*, from a young tree in the orchard of a Mr. Miller. I have been informed by reliable persons that there are some good small orchards in The Gore. I have not been able to go there, but if true—and I do not doubt it—it helps to prove what I have already said, viz., that the whole county is well suited to the production of apples. There is a wide extent of land in this county that is unfit for cultivation with the plough, on account of its rockiness. A very great proportion of such land might be made productive, by turning it into orchard. To attain this desirable end, a Pomological or Fruit-Growers' Association would be necessary to inculcate correct ideas with regard to the best sorts of fruit to plant, &c. The members of such an association, meeting from time to time, and comparing notes, would turn the information gathered by such to the general advantage. Such an association might also be used to protect the farmers of the county against the operations of tree agents or swindlers, who have greatly hindered fruit growing by having sold useless trees, that quickly died and left the impression that apple trees would not succeed in it.

Small fruits of all sorts succeed everywhere in the county. None are, however, grown for market, as far as I am aware. Currants, gooseberries, rasps, and strawberries, in the gardens, as well as blueberries and cranberries in the swamps, abound and are very productive, and nothing is wanting but for the attention of land-owners and others to be turned to the subject to make the county one of the principal fruit centres of Canada.

FRUIT REPORT FROM ST. JEROME.

 BY REV. FATHER LABELLE.

The waste of our wood and timber has acquired such proportions as to require the most serious attention, and it is high time that the cultivation of fruit trees should be encouraged and extended along the whole country side. Popular ignorance or error requires to be combated on this point. For instance, it is a mistake to suppose that our climate in the broken sections of the Province is unfavorable to fruit culture. The valley of the Ottawa is, on the contrary, quite as adapted to the cultivation of fruit-bearing trees as any other portion of Quebec. At fifty miles from Montreal the level of the land is only six hundred feet above the line of Lake St. Peter. The north-easterly winds are broken by the mountain ranges, and the same may be said of the westerly winds. At Rivière-du-Diable a settler planted apple trees which are in full growth, and there is no doubt that cherry and plum trees will do equally well. Up to the present the apples which have succeeded best at St. Jerome are the Peach, the Strawberry, and the Montreal Beauty. Mr. W. Gauthier has planted an orchard which promises exceedingly well. Messrs. Longweh and Hervieux have likewise had satisfactory success in the Ottawa Valley, where the soil is light and spontaneously drained. In certain parts, as in St. Jerome for instance, particular care is required to preserve fruit trees up to an advanced age. I noticed the same thing on several farms in the village of St. Jerome. Our experience is only limited, inasmuch as we are only just beginning this species of culture in our part of the country.

I might say a word of annular incisions to force unproductive trees to yield their fruit. This is a very ancient operation, of which even Virgil speaks. I have myself practised incisions for the growth of the trunk with considerable success.

HORTICULTURAL ASSOCIATION OF MISSISQUOI.

BY DAVID WESTOVER, SEC.-TREAS.

It is a gratifying fact that Missisquoi at last has a Horticultural Association.

On the 15th March last a well-attended meeting gathered at the Town Hall in Dunham, and elected a board of officers for the ensuing year, viz.: President, Hon. Thos. Wood; Vice-President, Jos. S. Baker; Sec.-Treas., David Westover; Directors: Messrs. R. Holden, David Mair, F. G. Desrivières, John Hunter, H. N. Sixby, and R. Alcombrac.

A meeting will take place in June, when the date of exhibition will be fixed upon, and a prize list arranged. It is confidently hoped that collections will be sent in from all parts of the country.

CHATEAUGUAY FRUIT REPORT FOR 1878.

BY ANNIE L. JACK.

The report of the fruit crop for this locality can be summed up in a few words. The mild and early spring developed the fruit buds, so that the promise was a rich harvest. But the blossoms of some varieties were expanded by the 12th of May, and then came a cold night, with frost, and chill winds. The result was that the crop of Fameuse was reduced one-half. Of Pomme Grise, there were none left, and while Baldwins and other late varieties suffered but little, our own orchard afforded exactly half a crop, the chief part being planted in Fameuse, and the same may be said of others in the vicinity.

Planting was largely and successfully carried on last season, and we do not intend to be discouraged by the frost blight, but hope for better things to come.

REPORT
OF THE
FRUIT-GROWERS' ASSOCIATION OF ABBOTTSFORD.

N. COTTON FISK, *President.*
CHARLES GIBB, *Corresponding-Secretary.*

Our Association held its third Annual Exhibition of Fruits, Flowers and Vegetables on 25th September last. A fine day brought our fruit-loving friends from far and near until there gathered on our quiet mountain-side at the very least 2,000 persons. That such a wide interest should be manifested in the work of a *local* Society, is a point that merits our closest attention. It shows a lively interest in Horticultural and Fruit Growing, that only needs to be organized, to show its power for good. It shows that there is a growing yet pressing need for such yearly gatherings of fruit growers with their fruits, at points to which the farmer can drive, and, what is important, take his family with him without incurring the expense of attending a city exhibit.

Of apples there were upon the tables 383 plates, which together with 37 of crab apples, made a total of 430 plates, which was quite equal to that of last year, though the close packing on wide tables, and the leaving of large spaces for collections which were expected but did not arrive, led many to think otherwise. This collection embraced over 60 varieties of more or less known grafted apples, several recently imported varieties appearing on exhibition for the first time in this Province. Of the 22 kinds of crabs, 13 were late importations, showing the kind of experimenting that is being carried on by this Society.

Of Out-door Grapes there were shown but 23 plates, small indeed compared with the year previous, when there were exhibited 23 different varieties and a total of 56 plates.

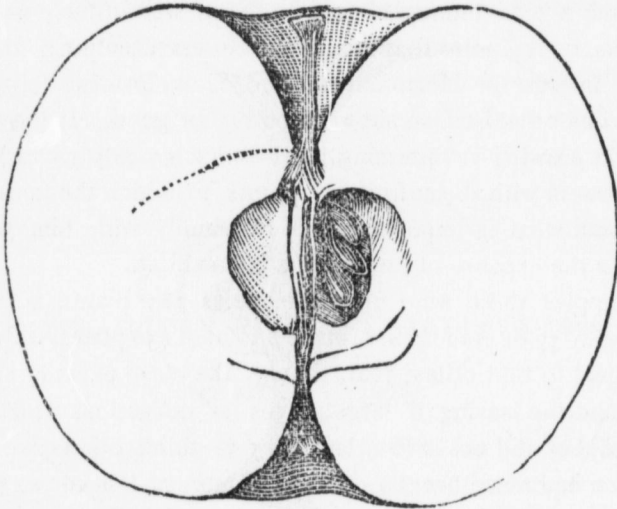
Our vegetables were meagre enough, for our melons and squashes were badly injured by what is with us so unusual, a late spring frost, and our roots, as the result of the intense drought, were ill-shaped and non-attractive.

The Floral display was not large, but tasteful and varied, and the floral designs, wreaths and hanging baskets added much to the general effect.

To the following apples we wish to draw special attention :

CANADA BALDWIN.—This seedling of St. Hilaire we wish to draw renewed attention to. It was described in the Fruit List for Province of Quebec published by us in 1875, also in the 2nd report of the Montreal Horticultural Society, p. 28, but experience to date shows us that in both cases we criticised it too harshly.

The tree is of undoubted hardiness, but its fault is that on warm dry soils the sap rises too soon, hence, if the hot suns of

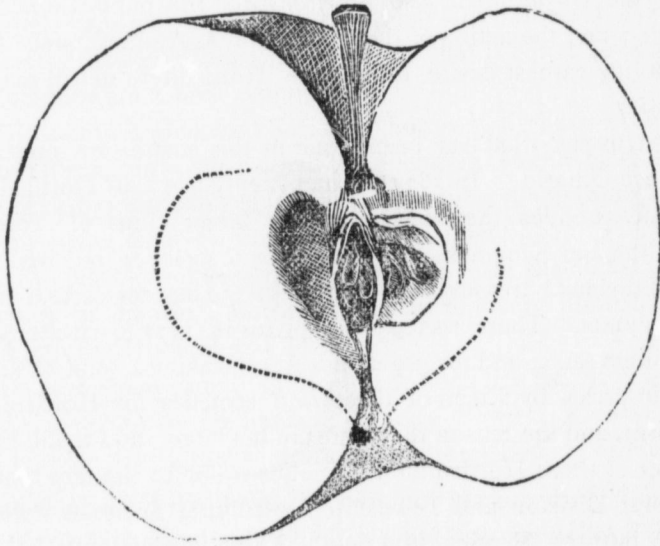


early spring are quickly followed by severe freezing, the trunk is apt to become sun-scalded. Should this happen, the tree still holds on to life with great tenacity. In heavier soils, even though in localities less favorable to apple growing, and in cold and even wettish soils, where Fameuse planted alongside of them have died, this Canadian Baldwin is a success both in tree and fruit.

The fruit is of fair size ; with us about the size of the Fameuse. In other localities where Fameuse attains less size, the Canada Baldwin is correspondingly larger: In quality it is good, in color mainly red and quite prepossessing in appearance. Its fruitage is

heavy, and keeps till April or May, and all things considered, we know of no long-keeping apple more worthy of planting in such soils as suit it.

LATE STRAWBERRY, *Winter Strawberry*, has not yet been described in the Reports of our Provincial Society. One tree of this variety was brought here by the late Col. O'Dwyer, about 1812, from the Spaulding nurseries, on Shefford Mountain, the grafts of which came from New England. It also found its way into Brome, where it has long been known as Wheeler's Lawrence. In nursery the tree is of slow growth and ungainly form and apt to reflect discredit upon the nursery that has raised it. In orchard it forms a



round but "brushy" head, and needs much pruning. It bears its fruit on the ends of the twigs, causing the tree to become drooping soon after it attains bearing age. The fruit is about medium to large, roundish, somewhat oblate and conic, often angular and furrowed. Flesh yellowish, yielding, juicy, with a peculiar aromatic and sub-acid flavor. It begins to ripen a few specimens during the last of August, and continues thus to ripen till the last of September. Those then barrelled keep till February. This habit of uneven

ripening is not against the fruit for family use. The tree is not to say long-lived, yet it bears so young and so regularly, and heavily, and the fruit is so saleable that we recommend it as a profitable market fruit.

FINIS.

Until 1877, no moneys were appropriated in this Province for purely horticultural purposes. The Montreal Horticultural Society, up to that time, was enabled to draw her annual grant of \$328 only as the Montreal Agricultural and Horticultural Society, and by offering certain prizes for agricultural products.

In 1877, however, the Montreal Society became a Provincial Society, with a yearly grant of \$1,000 for Horticultural purposes only, the Government also providing for the publication of its reports ; and the action of the Council of Agriculture, since then, shows its earnest desire to advance Horticulture in all possible localities.

Let us see what has been done in this matter by our sister Province Ontario. In 1877 she had twenty-five *local* Horticultural Societies, besides the societies in the larger cities of Toronto, Hamilton and Kingston, 18 of which *local* societies received from their Provincial treasury, the sum of \$1,750 besides certain municipal grants. There was paid in prizes in 1877 for fruits, \$491, for flowers \$944, and for vegetables \$544, making a total of \$1,979 paid in prizes by fifteen of these *local* societies for Horticultural purposes, and the reason that there are not larger, and a still larger number of these Horticultural Societies is due to the fact that the Electoral Division and Township Agricultural Societies enter so largely into the Horticultural field. These Agricultural Societies paid that year in prizes for fruits \$3,669, for flowers \$1,651, for garden vegetables (field root crops not included), \$2,408, making a total of \$7,728 spent by these Agricultural Societies upon the fruits of Horticulture. To this let us add \$1,343 paid at the Provincial Agricultural Exhibition for like purposes, and we have the sum of \$9,071 expended by the Agricultural Societies, or the total sum of \$11,094 paid by the Agricultural and Horticultural Societies for Horticultural premiums.

Let us see what has been done in our own Province. First, the Montreal Agricultural and Horticultural Societies paid in 1877 for premiums for fruit, \$114, flowers, \$457, vegetables, \$82, making a total of \$653 expended for Horticultural purposes.

Next as to *local* Societies. Until the organization of the Missisquoi Horticultural Society, in April 1879, we were alone, one of a system whose co-workers were as yet increate. Our Association paid in prizes in 1877, but \$26 for our 132 entries, a mere crown of wild olive. "It would have been of gold had not Jupiter been so poor." Yet with a prize list open to all, with exhibition free, and competition to non-members for the nominal sum of 50 cents, with large, but short-lived debts, this voluntary Association has drawn large and distant competition, and has gathered crowds of 2000 persons, largely from distant counties, even with this paltry prize list, showing that it is not to ourselves only that we are a want supplied.

Of County Agricultural Societies, however, we have a complete organization. In 1874 we had 81 Societies, with a membership then of 12,537, probably now much larger, subscribing over \$25,316, and receiving from our Provincial Government about \$38,775, or sixty-five per cent of the amount received by the Electoral Division Societies in Ontario. But they do but to a very limited extent enter into the Horticultural field.

In 1877 these County Agricultural Societies paid in prizes for Fruits about \$104, Orchards, \$116. In Flowers, \$106 is all we find noted. Of this, the No. 1. Agricultural Society of Huntingdon paid in floral premiums the sum of \$95 $\frac{4}{5}$, an amount which reflects great credit upon the Society and also upon the long and valued services of its ex-President, Mr. Daniel Brims. As to vegetables it is sometimes hard to define between the garden and field, let us say \$544, Gardens, \$93. Making a total of \$966 paid by these County Agricultural Societies for Horticultural premiums. To this we can add nothing from our Provincial Agricultural Society, for in making out the prize list it was forgotten that Flora and Pomona were among our tutelary deities. To the County Agricultural Society expenditure add that of the Horticultural So-

cieties, and we have as the total amount paid in 1877 by the Agricultural and Horticultural Societies of Quebec the sum of \$1,645 as compared with \$11,094 in Ontario.

These amounts, though made with a good deal of labor, are not absolutely correct. There are some omissions, but minor ones, and the sums total we present as close approximations, and such as will serve to show what has been done by a sister province, what should be aimed at by ourselves.

Our HORTICULTURAL NEEDS are—

- (1) Hearty coöperation from the County Agricultural Societies.
- (2) Distinct and independent organization of Local Horticultural Societies, for localities whose needs cannot be reached by Agricultural coöperation.

It may be said that many parts of Quebec are too poor to take much interest in such things. Farmers on some soils will continue to remain poor till they become commercial orchardists. In some exceptional localities even that most uncertain fruit, the plum, yields large returns. Small fruits bring high profits, and with some such the Montreal market is badly provided. The cranberry we import largely, yet many samples said to be American and first class both in color and size are the spontaneous growth of our own swamps. Market gardening when near market yields a profit far above that of general agriculture. The culture of winter blooming plants near Montreal has perhaps brought the highest return of all and the fact that we import largely what our own climate can as easily and cheaply produce shows that production is far from over done.

There is use, too, in beauty; if we must say it, there is moneyed value as well. To surround our houses with those "vegetable aristocrats," trees, contrasting the massive with the graceful, the formal with the eccentric, the fastigate with the drooping, is not a matter of expense. Such grouping can be managed with our own forest trees and need cost but a minimum of labor. It is but a taste—a taste, it is true, which does not appear to be everywhere indigenous, yet Edenic enough to be worth propagating.

Local Horticultural Societies when first organized give their

special attention to the apple ; but some one is enthusiastic about his (or probably her) grapes ; another prides himself upon his pears ; with another the love for flowers is so ardent that it becomes contagious, in fact epidemic, in the community. A properly organized society compounds these varied horticultural loves, and scatters them broadcast, while it adds the joy of conscious use to every horticultural pet we possess.

The prize lists of these local societies in some departments, at least, should be open to all. With a prize list restricted to our parish our usefulness would have been marred, our growth crippled. To see if other localities have not what we most need, is what we most need to know. We have been able to see the seedlings of adjacent counties only through the labor of visiting their orchards. They who wished have seen ours through a road so easy that it was almost the "royal road to learning" to them. But Missisquoi has organized her Horticultural society, and other counties have expressed their determination to follow her example. Thus our work now becomes co-work, and its usefulness largely dependent upon the hearty action of our *sister* societies.

May we point to a yet further, because a pressing want? Our position in the "cold north" is a peculiar one, not favorable to horticulture. Our list of "tree fruits" is incomplete, and has many blanks. Whence are these blanks to be filled?

(i)—From our seedling orchards, of which we have a large extent.

(ii)—From our isothermic lines, both to the East and West, not excepting Russia.

The Department of Agriculture at Washington (for our good rather than their own, we should suppose) received about ten years ago from St. Petersburg, scions of several hundred varieties of apples, though not all natives of Russia. Many of these are now being tested by Dr. Hoskins, of Newport, Vt., who will faithfully report upon their merits as they fruit.

A. G. Tuttle, of Baraboo, Wis., a few years ago received from the United States Consul, at Moscow, 150 varieties of Russian

apples, and we believe, some Russian pears. Ellwanger & Barry have imported largely, we know not how many; at any rate, 31 kinds. The Iowa State Experimental Station, under Prof. Budd, at Ames, received not long ago 200 varieties of apples from Russia, and were expecting 200 more.

Now shall we profit by all this costly importation from the home of the Duchess, the Astrachan, and the Alexander, or shall we not? Let us decide. Let us clearly see our course. If our decision be in the negative, let us at least know the cost of our inaction. If otherwise, let us with least cost accomplish the greatest and speediest results.

This importation from *our* isothermics is of far more relative value to us than to the United States. In fair play we should claim the right of paying our friends in the States half the cost of all this work, so directly is it to *our* advantage.

There is a way, however, in which we can make a partial repayment—a northern testing ground. Such would be of use to their North as well as to ourselves.

In Ontario, no such work has been done, because less necessary. The similarity of her climate to the adjoining States, whereby they all become unconscious workers in a common cause, the describing of new fruits in the monthly and in the yearly reports of her Provincial Fruit Growers' Association, and the distribution of certain trees and plants to her widely scattered members, as well as the healthy state of her nursery trade and the general leaven of experimenting that pervades her people, all go to make this, our great need, to her, but a minor want.

This testing of new fruit trees, new timber and ornamental trees, is to us a necessity to fair progress, on account of our peculiar position in the North. "It is a great work left undone," but a work not great in cost. The cost is but an investment in our own welfare. It is, however, a work that needs organization, organization having a controlling centre, and that centre a land owner. We need an EXPERIMENTAL STATION.

THE LATE S. JONES LYMAN, ESQ.

The community generally, and this Society especially, has suffered a serious loss in the decease of the well-known, genial and enthusiastic gentleman whose name is placed at the head of this paragraph, and who died April 1st of the present year.

No citizen, outside of official and political circles, was better or more widely known, and it is probably not too much to say that he was as highly esteemed as he was known.

Generous to a fault, his hand was ready to aid most cheerfully every enterprise of benevolence or public utility, and his skill and intelligence were such that his aid was most valuable.

The late Mr. Lyman was a diligent student, and frequently occupied the desk of lecturer on popular scientific subjects, uniformly with great acceptance.

But it is as an amateur horticulturist that we have chiefly to do with him here, and it is but just to say that the society had no more zealous friend and helper than he. Connected with it from its organization, either officially or otherwise, he labored to promote its interest with characteristic energy.

More recently he was specially known in connection with the collection and investigation of fungi, which pursuit has excited so much attention in Great Britain.

There are some persons who appear to possess a horticultural *instinct*, and the late Mr. Lyman was eminently one of this class.

It was said of the late Dr. Watts that in his youth he lisped in numbers, and it might have been as truly said of Mr. Lyman that "he breathed in flowers;" and few things gratified him so much as to secure a rare plant, unless it was the opportunity to bestow it upon an appreciative friend.

The subject of this notice advocated very strenuously the formation of a botanical garden under the auspices of this Society, and in connection with the University of McGill. But the

necessary funds for the permanent endowment of the enterprise not being forthcoming, it could not be carried into effect.

Our space forbids a more extended notice of one who has left a void in society which it will not be easy to fill.

RAIN AND SNOW FALL DURING 1878.

McGILL COLLEGE OBSERVATORY.

MONTH.	Inches of rain.	No. of days on which rain fell.	Inches of snow.	No. of days on which snow fell.	Inches of rain and snow melted.	No. of days on which rain and snow fell.	No. of days on which rain or snow fell.
January.....	0.40	5	30.5	18	3.35	3	20
February.....	0.28	3	10.2	12	1.28	2	13
March.....	0.58	8	19.4	14	2.41	4	18
April.....	3.55	19	2.3	2	3.78	2	19
May.....	4.11	18	1.0	2	4.21	2	18
June.....	1.18	14	0	0	1.18	0	14
July.....	5.47	14	0	0	5.47	0	14
August.....	3.95	22	0	0	3.95	0	22
September.....	1.59	11	0	0	1.59	0	11
October.....	5.39	19	0.1	2	5.40	2	19
November.....	3.47	16	14.6	12	4.93	4	24
December.....	2.70	4	32.8	24	5.94	2	26

Total rain fall during the year was 32.67 inches.

Total snow fall during the year was 110.9 inches.

Total rain and snow melted was 43.49 inches.

Total number of days on which rain fell, 153.

Total number of days on which snow fell, 86.

Total number of days on which rain or snow fell, 218.

Total number of days on which rain and snow fell, 21.

METEOROLOGICAL ABSTRACT FOR THE YEAR 1878.

MONTHLY RESULTS DERIVED FROM TRI-HOURLY OBSERVATIONS TAKEN AT MCGILL COLLEGE OBSERVATORY. HEIGHT ABOVE SEA LEVEL, 187 FEET.

C. H. MCLEOD, *Superintendent.*

MONTH.	THERMOMETER.				* BAROMETER.				WIND.		Sky clouded per cent.	Rain and snow melted.	MONTH.	
	Mean.	Max.	Min.	Range.	Mean.	‡ Max.	Min.	Range.	Mean direction.	Mean velocity in m. per h.				
January	13.14	41.9	-17.8	59.7	30.0489	30.681	29.239	1.442	† .0796	81.0	W.N.W.	11.04	70	3.35
February	22.06	45.0	-2.0	47.0	29.9734	30.344	29.634	0.710	.0935	72.2	W.N.W.	15.12	57	1.28
March	31.67	52.0	0.1	51.9	29.9506	30.616	29.244	1.412	.1351	71.7	N.N.W.	12.39	64	2.41
April	48.10	73.0	31.3	41.7	29.8229	30.233	29.288	0.965	.3751	79.0	N.E.	10.00	80	3.78
May	55.41	75.6	34.8	40.8	29.8578	30.239	29.484	0.735	.3102	69.6	W.	9.71	68	4.21
June	63.69	90.7	40.0	50.7	29.8765	30.260	28.617	0.633	.8803	63.6	W.S.W.	9.00	56	1.18
July	72.60	91.8	54.2	37.6	29.8961	30.229	29.345	0.884	.4920	62.2	W.	8.66	57	6.47
August	68.67	82.0	54.1	27.9	29.8263	30.144	29.381	0.763	.5233	75.0	S.W.	8.36	58	3.95
September	60.59	84.0	40.3	43.7	30.0562	30.521	29.534	0.987	.4451	75.3	S.	9.07	54	1.59
October	50.91	74.2	27.8	46.4	29.9385	30.410	29.441	0.969	.2983	77.8	S.S.W.	11.20	53	5.40
November	33.15	45.4	18.6	26.9	29.8688	30.496	28.971	1.525	.1592	82.3	W.N.W.	12.29	88	4.93
December	21.35	47.3	-1.2	48.5	29.8684	30.535	28.844	1.691	.0989	80.3	W.N.W.	13.73	81	5.94
Means.	45.278	66.91	23.34	48.57	29.91637	1.0622	.27422	74.17	10.877	65.9

* Barometer readings reduced to sea level, and to temperature of 32° Fahrenheit. † Pressure of vapor in inches of mercury. ‡ Humidity relative, saturation 100. § Observed. † Greatest heat was 91.8, on July 2nd; greatest cold was -17.8 on January 8th, giving a range of temperature for the year of 109.6 degrees. Greatest range of the thermometer in one month was 58.7 in January. The warmest day was July 2nd, the mean being 84.34. The coldest day was January 7th—mean temperature, 11.47. Highest barometer reading was 30.681, on January 8th; lowest was 28.844 on December 11th, giving a range for the year of 1.837 inches. Least relative humidity was 28 on July 5th. ‡ Greatest mileage of wind in one hour during the year was 50 on January 23rd, when the maximum velocity was at the rate of 60 miles per hour. Mean direction of the wind, west.

DONATIONS TO LIBRARY TO PRESENT TIME.

REPORTS FROM THE UNITED STATES.

Department of Agriculture, Washington.

Reports 1862, 65, 67, 68, 69, 70, 72, 73, 75, 76. 10 vols.

Presented by Gen. Leduc, per Consul-General Dart.

Reports 1877 and '78.

Presented by E. A. Carman, Dep. Ag.

United States Report on Forestry.

Presented by E. A. Carman, Dep. Ag.

Connecticut State Board of Ag., 1867 to 1869, and 1871 to 1877 inclusive.)

Presented by S. N. Wells, Weatherfield.

Illinois State Board of Ag., 1873 to 1877.

Presented by S. D. Fisher, Springfield, Sec.

State Ag. Soc., 1859-60, 1869-70. 2 vols.

Presented by S. D. Fisher.

State Hort. Soc., 1868 to 1872. 5 vols.

Presented by W. C. Flagg, Moro.

State Hort. Soc., 1876 to 1878. 3 vols.

Presented by S. D. Fisher.

Indiana State Board of Ag., 1875.

Presented by Alex. Heron.

Iowa State Hort. Soc., 1875.

Presented by G. B. Brackett, Denmark, Pres.

Iowa State Hort. Soc., 1876 and '77.

Presented by Prof. J. L. Budd, Ames, Sec.

Maine State Pom. Soc., 1873 to 1877.

Presented by G. B. Sawyer, Wiscasset, Sec.

Massachusetts' Hort. Soc., 1875 to 1878.

Catalogue of Library.

Presented by Robert Manning, Sec.

Michigan State Pom. Soc., 1872 to 1877.

Presented by Chas. W. Garfield, Grand Rapids, Sec.

Minnesota State Hort. Soc., 1863-73, 1874 to 1878.

Presented by Prof. C. Y. Lacy, Minneapolis, Sec.

State Forestry Assoc., 1878.

Presented by Hon. L. B. Hodges, Sec.

Nebraska State Board of Ag. 1873.

Presented by J. W. Moore, Treas.

Nebraska State Board of Ag., 1873 to 1876.

Presented by D. H. Wheeler, Plattsmouth.

New Hampshire Board of Ag., 1874 to 1877. 4 vols.

Presented by J. O. Adams, Manchester, Sec.

New Jersey State Hort. Soc., 1876 to 1878.

Presented by E. Williams, New Brunswick, Sec.

Ohio State Pom. Soc., 1875-6, 1876-7, 1877-8.

Presented by M. B. Bateman, Painesville, Sec.

Pennsylvania Fruit Growers' Asso., 1875.

Vermont State Board of Ag., 1872, 74, 75-6, 77, 78. 5 vols.

Presented by Prof H. M. Seely, Middlebury, Sec.

Western New York Hort. Soc., 1874 to 1878.

Presented by C. P. Reynolds, Rochester, Sec.

Wisconsin State Hort. Soc., 1869, 1870, 1872, 1878.

Presented by F. W. Case, Madison, Sec.

REPORTS FROM CANADA.

Upper Canada Board of Ag., 1857.

Ontario Board of Ag., 1873 to 1878. 6 vols.

Presented by Prof. Buckland, Toronto.

School of Ag. Guelph, 1876 to 1878.

Presented by Prof. Buckland.

Fruit Growers' (and Entomological) Soc., 1869 to 1878.

Presented by D. W. Beadle, St. Catharines, Sec.

Report on Philad'a Exhibition.

Presented by Wm. Evans, Montreal.

Geology and Resources of 49° Parallel.

Presented by Geo. M. Dawson, F. G. S.

Geological Survey of Canada, 1875-6.

Presented by A. R. C. Selwyn, F. G. S.

Fruits and Fruit Trees of America, by A. J. Downing, New York 1876.

Presented by G. Cheney, Montreal.

Fruit Garden, by P. Barry, New York 1872.

Presented by Wm. Evans, Montreal.

Am. Pomology, by Dr. Warder, New York 1867.

Presented by James D. Gibb, Montreal.

Fruit Culturist, by J. J. Thomas, New York 1875.

Presented by J. J. Gibb, Como.

Fruit Trees, by Coxe, Philada. 1817.

Presented by Chs. Gibb, Abbotsford.

Fruit Trees, by Forsyth, Albany, 1803.

Presented by Chs. Gibb, Abbotsford.

New Am. Orchardist, by Kenrick, Boston, 1844.

Presented by Chs. Gibb, Abbotsford.

Fruit Cultivators Manual, by Bridgeman, New York, 1845.

Presented by Chs. Gibb, Abbotsford.

Am. Fruit Gardeners' Companion, by Sayers, Boston, 1839.

Presented by Chs. Gibb, Abbotsford.

Book of Fruits, by R. Manning, Salem, 1838.

Presented by Chs. Gibb, Abbotsford.

- New England Fruit Book, by Manning, Salem, 1844.
Presented by Chs. Gibb, Abbottsford.
- New England Fruit Trees, by Jaques, Worcester, 1849.
Presented by Chs. Gibb, Abbottsford.
- Western Fruit Book, by Hooper, Cincinnati, 1858.
Presented by Chs. Gibb, Abbottsford.
- Miniature Fruit Garden, by Ths. Rivers, Am. Edition, New York
1866. Presented by Chs. Gibb, Abbottsford.
- Am. Orchardist, by Thacher, 1821.
Presented by Chs. Gibb, Abbottsford.
- Northern Fruit Culturist, by Goodrich, Burlington, 1850.
Presented by Rev. T. Johnston, Abbottsford.
- Small Fruit Culturist, by Fuller, New York, 1867.
Presented by Chs. E. Brown, Yarmouth, N. S.
- Grape Culturist, by Fuller, New York, 1865.
Presented by Chs. Gibb, Abbottsford.
- Grape Growers Guide, by Chorlton, New York, 1852.
Presented by Chs. Gibb, Abbottsford.
- Cold Grapery, by Chorlton, New York, 1853.
Presented by Chs. Gibb, Abbottsford.
- Grape Culture and Wine-making, by Phin, New York, 1863.
Presented by Chs. Gibb, Abbottsford.
- Grape in Australia and New Zealand, by Suttor, London, 1843.
Presented by Chs. Gibb, Abbottsford.
- Cultivation of the Grape Vine, by Hoare, Boston, 1845.
Presented by Chs. Gibb, Abbottsford.
- Vine and its Fruit, by Dennan, London, 1864.
Presented by Chs. Gibb, Abbottsford.
- Construction of Hot-houses, by Tenchars, New York, 1857.
Presented by Chs. Gibb, Abbottsford.
- Grape Vine, by J. Fisk Allen, New York, 1858.
Presented by Chs. Gibb, Abbottsford.
- New Am. Gardener, by Fessenden, Boston, 1828.
Presented by Chs. Gibb, Abbottsford.
- Beet Sugar, by Grant, Boston, 1866.
Presented by Chs. Gibb, Abbottsford.
- Practical Floriculture, by Peter Henderson, New York, 1868.
Presented by Chs. Gibb, Abbottsford.
- Rural Architecture, by Allen, New York, 1851.
Presented by Chs. Gibb, Abbottsford.
- Landscape Gardening, by A. J. Downing, New York, 1849.
Presented by Chs. Gibb, Abbottsford.
- Cottage Residences, by A. J. Downing, New York, 1844.
Presented by Chs. Gibb, Abbottsford.
- Agricultural Essays, by J. C. Gray, Boston, 1856.
Presented by Chs. Gibb, Abbottsford.

- Letters of Agricola, by John Young, Halifax, 1822.
Presented by Chs. Gibb, Abbottsford.
- Horticulture, by Hayward, London, 1824.
Presented by Chs. Gibb, Abbottsford.
- Rural Improver, by Pontney, London, 1822.
Presented by Chs. Gibb, Abbottsford.
- Ornamental Gardening, by Papworth, London, 1823.
Presented by Chs. Gibb, Abbottsford.
- Portraits of English Authors of Gardening, by Felton.
Presented by Chs. Gibb, Abbottsford.
- Encyclopedia of Agriculture, by Loudon, London, 1831.
Presented by Chs. Gibb, Abbottsford.
- Draining for Profit and Health, by Geo. E. Waring, New York
1867. Presented by Chs. E. Brown, Yarmouth, N. S.
- Nouveau Jardinier, 1879. Presented by Miles Williams, Montreal.
- Ontario Farmer, 1869, 1870, 2 vols.
Presented by Geo. W. Beers, Montreal.
- New England Farmer, 1829 to 1835, 7 vols.
Presented by Chs. Gibb, Abbottsford.
- Gardeners Monthly, 1865, 1866, 2 vols.
Presented by Mrs. C. J. Ferguson, Montreal.

PAPER.

- Royal Ag. Soc. of England, 63 vols.
Donor unknown.
- Journal of Ag. and Royal Highland Ag. Soc., about 50 vols.
Presented by Wm. Evans, Montreal.
- Gardeners' Monthly, 1867 to 1874.
Presented by Mrs. C. J. Ferguson, Montreal.
- Forestry Annual of Iowa State Hort. Soc., 1878.
- Montgomery County (O.) Hort. Soc., 1878.
- Conn. Ag. Experimental Station, 1877.
- Hamden Co. (Mass.) Ag. Soc., 1875.
- Nebraska Hort. Soc., 1871.
- Nebraska State Board of Ag., 1869.

PURCHASED BY THE SOCIETY.

- New Book of Flowers, by Breck.
- Book of Roses, by F. Parkman, Boston, 1866.
- Bulbs, by Edw. S. Rand, Boston, 1873.
- Rural Essays, by A. J. Downing, New York, 1853.
- Trees and Shrubs of Mass., by Geo. B. Emerson, Boston, 1846.
- Encyclopedia of Gardening, by J. C. Loudon, London, 1871.
- U. S. Dep. Ag. Reports, 1858 to 1861, 1863, 1864, 1866 and
probably 1871 and 1874.
- Illinois State Hort. Soc., 1873, 74 and 75.